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The Millennial Experience:
Internship Research Findings

McNairs Research Project
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Introduction

On January 10th of this year, I left West Virginia and moved to Washington, D.C., to work for the American Council for the United Nations University on a project called the Millennium Project. The very concept of a millennium is arbitrary because it is based on the Christian calendar, which was not adopted for worldwide use until the late 1800s. If we were using the Jewish calendar, this year would be 5759, not close to a millennial year. The Hindu calendar says that this is 5101, and according to the Muslim calendar it is only 1377. The year 2000 on the Christian calendar is the first millennium on any calendar that will be widely noted.

In the year 1000, there was no celebration even in the Christian world because without printing presses, calendars were not generally available. Life was governed more by the change of the season than by the passage of years. Few people even knew it was the year 1000. This is the first time that the entire world will celebrate a millennium, sharing a review of the past and hopes for the future.

Background

2.1.1 Organizational Background

The Millennium Project's history provides insight into the purposes of this organization and the workings which go on therein. In 1969, the former United Nations Secretary-General, U Thant suggested the creation of a United Nations University, which would be, "truly international in character and devoted to the Charter's objectives of peace and progress." The University is an autonomous organ of the United Nations General Assembly and is jointly sponsored by both the General Assembly and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). The UNU's Charter states that its aim is to foster "intellectual cooperation and research among scholars and scientists for the purpose of understanding and solving the pressing global problems of human survival, development and welfare." Unlike all other organs of the United Nations system, the UNU is not made up of nation states. Rather, its members are scholars and scientists using worldwide networks, along with its own research and training centers located in Tokyo, Japan. The University Council sets the principles and policies of the university and consists of 24 members who are appointed for six-year terms by the Secretary-General of the United Nations and the Director-General of UNESCO. Both of these officials, plus the Executive Director of the United Nations Institute of Training and Research (UNITAR) make up the three ex officio members. Ultimately, these three members, the twenty-four scholars and the U.N. Rector make up the council. The UNU has several liasons around the world, which are each responsible for the gathering and dissemination of infromation and research. The United States' liason to the UNU is located in New York City, New York.

The American Council for the United Nations University is located in New York City, New York and was established in December, 1977. The Millennium Project of the

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American Council for the UNU is a non-profit, non-governmental agency. In 1992, a three-year feasibility study was conducted "to provide a global capacity for early warning and analysis of long-range issues, opportunities, and strategies." Approximately 200 futurists and scholars from 50 countries participated in this study which was funded by the US EPA, UNDP, and UNESCO. The feasibility Phase I began in 1992 to identify and link futurists and scholars around the world "to create the initial design of the Project and conduct a first test on population and environmental issues." Phase II lasted from 1993-1994, during which time a series of reports were created on futures research methodology and long-range issues important to Africa. Phase III followed up from 1994-1995 under the auspices of UNU/WIDER and concluded with the final feasibility study report, which is available on the internet at http://nko.org/millennium.

This study concluded that the purpose of the Millennium Project should be "to assist in organizing futures research, update and improve global thinking about the future, and make that thinking available through a variety of media for consideration in public policy making, advanced training, public education, and feedback to create cumulative wisdom about potential futures." The Millennium Project offices are located in Washington, D.C.

2.1. What is Futures Studies?

The Millennium Project deals with Futures Studies and Research. To study the future is to study potential change, not simply fads, but what is likely to make systemic or fundamental differences over the next 10 to 25 years or more. Studying the future is not simply economic projections or sociological analysis or technologic forecasting, but a multidisciplinary examination of change in all major areas of life. As historians are suppose to tell us what happened and journalists tell us what is happening, futurists tell us what could happen and help us to think about what we might want to become. Futurists do not know what will happen. They do not claim prophesy. The purpose of future studies is not to know the future but to make better decisions today.

2.1.1.Shortcomings of Futures Studies

There are shortcomings to futures research. Futures research is not a science; it does not have controlled experiments like physics and chemistry. Nor is it yet universally recognized academically as an established field for doctoral research. Few universities offer graduate futures degrees. Possibly the first in 1969 was the doctoral Program for the Study of the Futures in Education at the University of Massachusetts, but it closed in 1991. One can still get a doctorate degree of prospective and strategic studies at the Conservatoire National des Arts et Metiers in Paris. Other more tightly focused doctoral programs are in Political Science at the University of Hawaii and in Systems Science at Portland State University in the United States. However, countless doctoral dissertations have used the methods and concepts pioneered by futurists.

We have always known it is smart to think ahead. But futurists do this as a profession, on a large scale, and have methods and a body of writing to think systematically through the possibilities of tomorrow. One day, futures research may become an organized body of assumptions and methods with a more formal academic

tradition: in the meantime, it can be thought of as an art in that it is creative and/or as a craft in that it applies knowledge with skill. In summary, if we do not know the consequences of our choices, our freedom to choose is an illusion. Hence, no freedom exists without forecasting, as was well argued by Bertrand de Jouvenel in the *Art of Conjecture*.

Scenario Scanning

A vital part of the Millennium Project is the accumulation of normative and exploratory scenarios. In replace of a literature review, Mr. Glenn suggested that I work in conjunction with Susan Jette, to add to annotated bibliography of scenarios.

3.1. What is a Scenario?

A scenario is a narrative description of the future that focuses attention on causal processes and decision points. The term scenario comes from the dramatic arts. In the theatre, a scenario refers to an outline of the plot; in movies, a scenario is a summary of direction for the sequence of action. Scenarios are written as a policy analysis tool that describes a possible set of future conditions.

3.1.1. A Brief History of the Scenario

Herman Kahn introduced the term "scenario" into planning in connection with military and strategic studies conducted by the Rand Corporation in the 1950s. He further popularized the concept in the 1960s as director of the Hudson Institute, a private nonprofit research center devoted to issues related to U.S. public policy, international development, and defense. In 1967, Kahn along with Anthony Weiner examined the future possibilities of world order, describing potential power alignments and international challenges to American security in a book entitled *Toward The Year 2000*. Corporations developed scenarios as their planning became more sophisticated. Shell International Petroleum Company used scenarios before the 1973 oil shock. The method proved useful in allowing Shell to anticipate the rise and subsequent fall of oil prices. The onset of the energy crises encouraged scenario development and introduced it to the public. Two well-known energy futures scenario projects were Project Independence and the Ford Foundation's Energy Policy Project.

3.2. Two Types of Scenarios

There are two types of scenarios. "The exploratory scenario depicts self-consistent worlds that could emerge from the present through credible cause, effect and feedback developments and reach an end point that seems plausible." Then, there is the normative scenario. "The normative scenario represents desirable future worlds. They are also self-consistent and employ credible cause, effect and feedback relationships to get from the present to the future state, but that future state represents a goal rather than happenstance." (Glenn 1998)

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Literature Review

Due to the nature of my research project, the following literature review is in the form of annotated bibliographies. These are further divided into the following four categories: International Economics and Wealth; Environmental Change and Biodiversity; Technological Capacity; and Demographics and Human Relations. The following annotated bibliographies were done in conjunction with Susan Jette. However, all of the books were pre-scanned by myself and found by myself at the Library of Congress.

4.1 International Economics and Wealth

Global Scenarios The Forbes Group, Island Press, 1998

The Forbes Group analysed an underlying assumption of three global scenarios impacting capitalism and economies worldwide. Lack of faith in government and serious declines in voter participation as in the US during the nineties, leads to government dominated by special interests that tend to further alienate voters. It is generally felt that the old and familiar institutional frameworks that held the world together after World War II are not up to the task of managing the "triple revolution" that is changing the world: technological revolution that is transforming the world into an information society; an economic revolution, as communism and managed economies give way to increasingly unfettered capitalism; and a market-driven world, and a political revolution, replacing distatorships of the right and the left with young democracies. The joint impact has shattered the institutional framework of the world forever. *Scenario 1. Institutional Decay:* "The bureaucratic desire for self-preservation prevents reform. Without reform, institutions become overwhelmed worldwide. Existing institutions, though weakened, have enough political strength to derail most reform efforts. Resistance hardens around the limited self-interest of the institutions themselves and those who are dependent on them. This response is not sustainable in the long run, however, and leads eventually to institutional collapse and a power vacuum in society. This slow rot is similar to the process that produced the final collapse of the Soviet Union and Eastern European communism. Unable to accept their own limitations and failures and change with the times, the Communist parties adopted a siege mentality that led to their costly and sometimes bloody destruction." (Did the capitalists get the answer right or did both schools get the question wrong?) *Scenario 2. Baling Wire and Chewing Gum:* " This scenario assumes that the self-preservation instincts of western institutions result in some constructive responses to the radical changes by the turn of the century. This happens because western governments have a tradition of at least pretending to respond to popular concerns. But these reforms are concessions grudgingly made only to assure the preservation of the institutions, not to actually solve the problems. Under this scenario, change is superficial and shallow, the proverbial rearranging of the deck chairs on the Titanic. Some individual institutions may indeed disappear under this scenario. For example, the Conservative parties in Canada and Britain or the Democratic Party in the U.S. might ultimately follow the Communist parties

of eastern Europe into the ash bin of history, but national party structures remain the prevailing form of political organization. To defend national sovereignty while appearing to respond to globalized issues, weak international institutions such as the World Trade Organization or the UN are reorganized but essentially preserved in their current form."
Scenario 3. Creative Destruction: " The final scenario assumes that early 20th Century economist Joseph Schumpeter was right. Every product, market, industry, nation or institution moves through a life cycle of creation, growth, destruction and replacement. Today's institutions are either circumvented or replaced by new institutions more able to develop emerging technologies and adapt to changing political climates. There are many parallels for what is happening. Factories replaced cottage industries. Farm machinery brought corporate farming and the transformation of the United States from a rural to an urban society. The civil rights movement and major social and economic change led to the transformation of the Old South from a Democratic to a Republican stronghold. World War II brought the end of worldwide colonial empires." (Are the rapid changes in global communications, information management, government and trade as significant? Maybe.)

World Boom Ahead: Why Business and Consumers Will Prosper Knight Kiplinger. Kiplinger Books ISBN: 0938721550 October 1998.

In "World Boom Ahead," Kiplinger provides a positive vision of the global economy of the future. His belief in a steadily improving human condition andbelief that a dramatic improvement in living standards lies just ahead is a brightspot since he writes so plausibly. He believes that intelligent organizations can navigate through turbulent times and the accelerating pace of change. For example, 1997 marked the year that would define the millennium. In that one year, the world was treated to an amazing array of developments in technology, world affairs, and business that in an earlier time, would have constituted a whole decade of change, but crammed into a year: near-collapse of Asian economies followed by expensive international rescue; western corporate mega-mergers and invasion of the east; Indian and Pakistani nuclear testing and mounting belligerence; rebirth of U.S. antitrust police; new miracle drugs; impact of Galaxy IV malfunction worldwide; for-profit venture to decipher the human genome in competition with government; the reality of cybersabotage on every level. But also points out the wisdom of scenarios, as the following scenarios all contain elements of plausibility:
Scenario 1. Severe Overcapacity and Deflation: "The growth in world manufacturing capacity will be so great, especially in the developing nations, that even rising consumer demand cannot possibly keep up. This will lead to aggressive dumping of exports, price cutting, the raising of trade barriers, general deflation, shrinking output worldwide and declining real wages, especially in the advanced nations. *Scenario 2. "Hot Money" Chaos:* " Uncontrollable flows of capital will surge in and out of world economies, especially emerging markets, destabilizing currencies and causing wild swings in production and living standards. Currency and stock speculation will run amok. A series of serious national and regional recessions will infect the entire global economy, causing worldwide slumps of long duration. The rescue resources of the advanced nations, funneled through the International Monetary Fund, will not be sufficient to shore up all the economies in need of help at one time." *Scenario 3. Burdensome Aging*

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Populations: " About 15 or 20 years from now, the advanced nations, with their low or negative population growth (including even China by then), will be groaning under the social-service expenses of their aging populations. A mass of retirees will have to be supported by a proportionately smaller group of workers, pushing taxes up and diverting economic resources from investment to consumption. What's more, stock markets will decline as seniors cash out to cover their living expenses." *Scenario 4. The Malthusian Nightmare:* " Soaring populations in today's "Third World" will outstrip the world economy's capacity to support them with food, water, fuel and jobs. This will lead inexorably to resource depletion and soaring prices, famine, out-of-control urbanization, environmental degradation and attempted mass migrations of poor people into advanced nations, where they will be unwanted but sometimes needed to fill labor shortages." *Scenario 5. Four Horsemen of the Apocalypse:* The biblical scourges—famine, plague, conquest and war—will recur as they have throughout history, but in more-virulent forms. Populations will be decimated and living standards compromised by antibiotic-resistant bacterial and viral infections, some of them trans-species infections like AIDS. Raging nationalism, ethnic and racial conflict will be as devastating to life and material well-being as communism and fascism were in this century. New kinds of tyrannies will subjugate large portions of the globe. Warfare will be made all the more terrible by the use of nuclear, chemical and biological weapons.

The Silver Lining of Global Imbalances, Global Economic Forum, The Latest Views of Morgan Stanley Dean Witter Economists. http://www.ms.com; headed by Stephen S. Roach, chief-economist and director of Global Economic Analysis.

Stephen Roach, chief economist and director of Global Economic Analysis, writes the latest views of the economists at Morgan Stanley Dean Witter, one of the most prestigious investment firms in the world. With America the sole locomotive of a dire world, there has been concern about a destabilizing endgame dominated by the US balance of payments crisis (while Japan and Europe enjoy a surplus). Such disparities in balance of payments among the world's three major trading blocs plus the US emerging as the world' s importer of first and last resort makes great fodder for some interesting global economic scenarios because of the dichotomy - a domestically driven US economy that has spawned externally driven growth elsewhere in the world. The key question is such an outcome sustainable? Is the world fed up with ever-widening current account imbalances? Morgan Stanley proposes a scenario of global healing. *Scenario: Global Healing:* The dollar continues to hold, rising against the yen but falling a bit against the euro at the turn of the century. Currencies are really just the measure of the degree of attractiveness of one asset against another. With Japan in a liquidity trap and the new European Central Bank having to take some time to earn credibility, threats to the dollar are unlikely to happen. The global imbalance may infact, have a silver lining, riding a wave of global healing - a world that is willing to wait it out. It owuld be a transition to a more synchronous outcome for the world economy at the turn of the century, and likely to be a major fundamental supportive force for the next decade. In "Global Healing" the American consumer will then cease functioning as the world's sole surviving locomotive and global current-account imbalances will begin to move back toward a more stable

alignment. History will undoubtedly treat the gaping US balance-of-payments deficit quite kindly. The international shortfall could well turn out to be America's ultimate bill for financing the recovery of a world in crisis. But this same "external leakage" -- which kept a 4.3% increase in 1998 real GDP from turning into a 5.5% gain -- has also served the useful purpose of preventing a serious overheating of the US economy.

Two Scenarios for 21st Century Organizations, Sloan School of Management at MIT, 1997

In 1994, the Sloan School of Management at MIT inaugurated a multi-year research and education initiative called "Inventing the Organizations of the 21st Century." One of the key activities for this initiative has been developing a series of coherent scenarios of possible future organizations. Scenario planning was chosen as one of the key approaches for the 21st Century Initiative, since it provides a structured methodology for thinking about the environment in which future organizations will operate and the likely form those organizations might take. This paper describes the results of the scenario development activity to date and suggests directions for future work. Some areas of driving forces discussed were: technology, human aspirations, globalization, complexity, and demographics (in particular, center of gravity of world population and wealth shifting away from North America and Europe). An uncertainty that emerged in the discussions of the Working Group most often was the size of individual companies. Will organizations in the future be much larger, much smaller, or not very different in size from the organizations we know today? *Scenario 1. Small Companies, Large Networks* (focus on how work might be organized in ever-shifting networks of small firms and individual contractors): Imagine that it is now the year 2015....A world of fluid networks for organizing tasks and more stable communities. The corporation of the late twentieth century was just a transitional form; but in 2010, nearly every task if performed by autonomous teams of one to ten people, set up as independent contractors or small firms, linked by networks. Work is ad hoc. Automobiles, for example, would be designed by a coalition of hundreds of competing firms that are autonomous and self-organizing. Authority is not so much through command channels as teams, especially in areas demanding innovation. Since the contractual life would be lonely, independent organizations are used for social networking, learning, reputation-building and income smoothing. *Scenario 2. Virtual Countries:* (large vertically- and horizontally-integrated firms; pervasive role of firms in employees' lives; employee ownership of firms; employee selection of firm management). Imagine that it is now the year 2015 ... The huge global conglomerate has emerged as the dominant way of organizing work from cradle-to-grave br providing income and job security, health care, education, social networking, and a sense of self-identity. Organizations are as powerful and influential as nations. People are defined not so much by geographic location as they are by the company. Employees own the firm in which they work; just as the modern nation states ultimately turned to democracy, many of the corporations of the twenty first century have moved to representative governance.

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The World Economy in 2020 OECD Observer, 1998

Using a computable 'general equilibrium' model known as the 'Linkages' model, the OECD Development Centre designed two contrasting visions of the world economy in the year 2020. The models incorporated a fundamental high-growth future verses a low-growth future on the effects on trade, production and employment patterns, on food and energy markets, and on the global environment. The most significant trends seen is the flourishing two-way trade between OECD countries and non-OECD countries and the increasing capital flows to non-member countries such as Brazil, China, India, Indonesia, and Russia, known as the "Big Five", already becoming substantial importers. Both projections assume that basic resources (population and natural resources) and behavioral relationships will remain broadly similar in the future. *Scenario 1. High Growth Worldwide:* The vision presented here is an optimistic one, and if realized, could provide the means to tackle current and future challenges—not least poverty, environmental degradation and aging. Trade opportunities expand as the liberalisation of trade, falling transport and communications costs, and increased international mobility of capital could work together to bring about a further opening-up of economies. The benefits from the global mobility of capital accrue from a more efficient allocation of world savings to the most productive investment opportunities and the possibility of smoothing consumption by borrowing or diversifying abroad. Under the assumption of high growth, world agricultural production would expand at roughly the same rate over the next 25 years as over the past two decades, with productivity improvements contributing most of it. However, one of the major worries raised by the high growth projection is its environmental implications. *Scenario 2. Low Growth Worldwide:* The OECD vision of this world is not so much an antithesis to positive structural forces that spawn high growth, successful scenarios, but rather, slower progress with policy reform in OECD and non-OECD countries - with less trade liberalization and will less rapid advance on domestic policy reforms, not least in fiscal consolidation, removal of domestic subsidies and structural policies - could result in lower (perhaps much lower) growth rates. The assumption of the "virtuous circle" of growth is very strong in both scenarios, as the number of forces driving developments in the world economy, chief among them demographic change, technological innovation, international trade and financial liberalization - how these forces intertwine has prime importance to providing a framework for long-term planning in OECD economies.

4.2 Environmental Change and Biodiversity

Meeting the Challenges: Natural Resources and Environmental Scenarios. Chris Fay, chairman and chief executive, Royal Dutch Shell . Given in an address to the Foresight Sustainable Technologies for a Cleaner World Conference.

Royal Dutch Shell scenarios given by speech to Natural Resources and Environment Foresight Panel. Shell and government Technology Foresight Program - government's aim of encouraging long-term planning and helping British industry to capitalise on new

markets and technologies over the next twenty years. Enivronment for the benefit of future generations. Building a sustainable future will require a partnership, shared expertise and experience. Challenge of government, industry, academia, NGOs and consumers. Two long-term energy scenarios which are helping to drive important research and development and which are pointing to new business opportunities for the future. We believe that technological advance is essential both for continued economic growth and for developing new and more successful approaches to environmental management. Our faith in good science remains undented. We agree with the Government's Panel on Sustainable Development that "in future we shall be more rather than less dependent on technology for our society to be sustainable." *Scenario 1. Sustained Growth:* "This scenario suggests that global energy demand will continue to grow at its current rate of about 2 per cent a year. Under this scenario, the world's energy supply will see a continuing trend from high to low carbon fuels, from coal to oil and gas, and to renewables. In other words, continued decarbonisation. Over the medium-term, Shell believes that renewables will at last begin to compete in terms of price, availability and convenience. The 'Sustained Growth' scenario indicates that renewables may have about 5-10 per cent of the energy market by 2020. This process accelerates after 2020, as continuing innovation lowers renewable costs, and depleting reserves lead inevitably to higher prices for oil and gas." *Scenario 2. Dematerialisation:* Under this scenario the world experiences far more radical changes in energy consumption. Improved energy efficiency and the more widespread use of new information technologies, particularly in the developing world, suggests that the world's increased energy needs will be met with fewer materials and less energy. Overall, demand for energy rises more slowly because human needs are met through technologies which require lower energy input. It's easy to see how this scenario could be used to encourage practical solutions to today's sustainable development challenges. For example, in road transport, the widespread use of "cleaner" vehicles is not going to come about overnight. No-one, least of all, individual companies can wave a magic wand and solve Britain's air quality problem just like that. But it is possible to envisage a convergence of complementary developments in politics, business and wider society. Government action, the development of new technologies and lighter materials in car manufacturing, and the widespread availability of alternative fuels could all come together. According to this scenario, "new generation vehicles" three times more fuel efficient than today's vehicles, could become commonplace.

Five complex forces could change structure of industry. Roland Kjell, The Oil and Gas Journal, 04/13/98.

Projections about the future of energy fall into Conventional or Environmental (Green) categories.
Although the issue of global warming dominates the Green projections, there are other forces in
addition to the environment that are capable of undermining the current structure of the energy industry.

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Expectations for the coming decade: Much effort has been devoted to looking at the future of energy, particularly for oil. Despite an impressive amount of sophisticated computer methodologies, the reputation of energy forecasting has been in decline. Long term trends in energy consumption display some remarkable resilience in the underlying structures that determine energy growth. The dramatic rise and fall of oil prices over the last few decades were more than blips in the curves, but they hardly caused fundamental changes to the relationship between economic activity and energy use. The role of oil relative to other energy sources has not changed in any permanent and fundamental way. However, climate policy may eventually call for a change in historical trends, and this is currently reflected in forecasts of energy futures. To illustrate this, Kjell collected energy scenarios from a number of respected and well known institutions involved in the analysis of future energy developments and divided them into two basic scenario camps: "Green Scenarios" and "Conventional Futures". The fundamental difference between Green Scenarios and Conventional Futures is 2022 mtoe in 2020. *Scenario-set 1. Green Scenarios:* Exit fossil fuels? Many seem to believe that the oil age will soon be over. Green Scenarios show lower overall growth in energy consumption, albeit not drastically lower. The basic fuel mix remains generally the same. In the Green Scenarios , global oil consumption grows by 0.5% per annum from 3,180 mtoe in 1990 to 3,714 mtoe in 2020. At the end of the forecasting period, oil demand approaches a plateau and further growth in developing countries is offset by a decline in consumption in industrialized countries.   For gas, the situation appears to be even less dramatic. Global consumption grows by an annual rate of 1.5% to 2020. Gas is less vulnerable to environmental measures than oil and coal because a number of environmental policies may result in a change in the fuel mix in its favor. Green Scenarios contain vigorous environmental policy efforts, and as a result, stretch the imagination compared to what has been observed in energy/environmental policies. Still, they are less radical than many environmentalists would like to see, and less alarming than some industrialists fear. *Scenario set 2. Conventional Futures:* Starting with overall energy consumption, in most scenarios , energy consumption increases from 7,850 mtoe in 1990 to 12,550 mtoe in 2020, by 1.5%. annually. This compares with 1.0% per year to a total of 10,550 mtoe in Green Scenarios . Relative to historical trends, both projections are low. In the past 3 decades, global total primary energy (TPE) increased more than 2.5% annually (1965-1996 = 2.6%, 1970-1996 = 2.1%). The Conventional Futures energy growth of China (TEA, 1996a) is set at 4.2% per annum to 2010 based on a GDP growth rate of 7.8. Keeping the same energy intensity decline as in the International Energy Agency (TEA) forecast, an economic growth of 10.1% would imply an energy consumption level in 2010 of 1,800 mtoe, 23% higher than in the IEA forecast and 176% above the 1990 level. This illustrates that if China, and other developing countries for that matter, succeed in their striving for modernization and economic development, energy demand growth may turn out to be notably higher than most of the forecasts have shown in Conventional Futures.

Global Environmental Scenarios 2000 - 2050 World Business Council for Sustainable Development, 1998.

Sustainability is a topic of our age. In creating global environmental scenarios, the Council for Sustainable Development conducted extensive interviews. The Council started with the Brundland Commission's definition of sustainable development: "Humanity has the ability to make development sustainable – to be sure it meets the needs of the present without compromising the ability of future generations to meet their own needs." The Council's explorations of sustainability identified these major components: economy and technology, ecology and demography, and governance and equity. These components are embedded in the prevailing myths – those deep premises on how the world works, which we take for granted. In industrial and trading societies, for example, the economic myth of self-interest dominates. The Council built three scenarios to illustrate the number of plausible routes forward that pose challenges to business. *Scenario 1. Frog:* "The world of FROG! is a familiar world - at least at first. Many nations experience a fair degree of economic success, and, for almost all, economic growth is the major concern, with sustainable development acknowledged to be important, but not pressing. As environmental NGOs continue to demand enforcement of standards that have been set in global summits, those nations who are striving to develop argue that if the developed nations insist on raising environmental standards, they should "First Raise Our Growth!" Indeed, in this scenario, some nations leapfrog from underdeveloped status to benchmarker in particular areas of technology. People in western nations respond in uneven ways—sometimes by offering help in improving the environment, and sometimes in raising various cries of "FROG!"...But, by 2050 there is evidence that the darkest predictions about global warming are actually nearer to the truth than the more optimistic ones." *Scenario 2. Geopolity:* Geopolity begins with a succession of signals in the first two decades—some real, some imagined – that an environmental and social crisis looms. The prevailing "economic myth" is increasingly viewed as dangerously narrow. This is particularly true in Asia, where rapid economic growth has meant that corners have been cut and traditions lost. Because many institutions, especially governments, have lost credibility as problem-solvers, people expect something from the new centres of power—multinationals. But the business sector seems unable or unwilling to respond adequately. ...In the absence of leadership from business and government to solve problems, people form new global institutions such as the Global Ecosystem Organization (GEO), with broad powers to design and enforce global standards. *Scenario 3. Jazz:* In the world of Jazz, diverse players join in ad hoc alliances to solve social and environmental problems in the most pragmatic possible way. The key note of this scenario is *dynamic reciprocity*. This is a world of social and technological innovations, experimentation, rapid adaptation, much voluntary interconnectedness, and a powerful and ever-changing global market. What enables the quick learning and subsequent innovation in Jazz is high transparancy—the widespread availability of information about ingredients of products, souces of inputs, company financial, enviornmental, and social data, government decision-making processes, and almost anything else consumed with what consumers want to know. ...Jazz is a world in which NGOs, governments, concerned consumers, and businesses act as partners—or fail."

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Victory Cities Orville Simpson, http:www.victorycities.com, 1999

Present-day cities are already obsolete and are threatening to engulf the entire countryside. According to Orville Simpson, futurist in urban planning and renewal, Victory City ™ is the wave of the future. His vision is to build an entire city under one roof, to be built and operated by private enterprise alone. There will be not just one, but many such cities throughout the entire world. The scenario of Victory City is highly plausible and realistic as Simpson takes the reader through his website (www.victorycities.com) and introduces a utopia of no crime, no pollution, and no over-crowding. Future projections show tremendous advances in heating, venting, air conditioning, air purifying, and humidity control so that rooms will be pleasant, healthful, and comfortable. Victory Cities will create a higher standard of living for people, but will require less natural resources, money and energy to achieve it. *A Scenario of Victory City:* Among the extensive list of contents in the Resident's Guide, the viewer of this site can click on any aspect of this futuristic city - from schools to safety and security, to postal systems. The money system, for example, is such that no money will be used. Instead, everyone will carry a bankbook that automatically debits purchases. Bills are deducted automatically. In the food system, the bulk of food will come from the city's own farms in the surrounding countryside. Fresh foods are brought into the city, cooked, served, and eaten on the same day. Food is cooked in all-electric kitchens, brought to the cafeteria on high-speed elevators, and served on a Circl-Serve. From a nutritional standpoint, this will bolster the health and stamina of citizens, and contributes to the more favorable future evolution of man. Transportation connects all cars, trucks, busses, monorails, and railroads. Citizens can go from any one place to another, anywhere in the city, in only five to ten minutes and without hurrying. Cars are replaced by electric cars the size of wheelchairs within the city. Auto accidents are kept to a minimum, as automobiles are only used to travel between cities. The most unique feature of the scenario are the innovations applied to protecting the environment, e.g. 90% trash eliminated before it gets started (since apartments will have no kitchens); high-end recycling; no cemeteries; no emissions.

4.3 Technological Capacity

Three Scenarios on the Future of Technology and Democracy Benjamin Barber, Political Science Quarterly, 1998.

The theme of technology and society has become a popular topic for futurists, but the relationship between democracy and technology remains in many ways, ambiguous. According to Barber, it is essential that this relationship be better understood. Is technological growth likely to support or corrupt freedom? Are we finally to be mastered by the tools with which we aspire to master the world? The conventional wisdom suggests that science and technology, by opening up society and creating a market of ideas, foster more open politics and markets. With the increasing rate of change typical of modern societies as a fundamental assumption, Barber explores three scenarios.

Scenario 1. The Pangloss Scenario: This scenario is rooted in complacency and is simply a projection of current attitudes and trends. Pop futurologists believe that technology will solve nearly all societal problems. Al Gore and other techno-zealots believe that computers for the poor and hard wired schools will begin to solve poverty and education; that technology will improve our lives and that we can rely on market forces to realize the perfect technological future. However, as broadband width expanded and a multiple spectra developed, real content programming has remained somewhat limited - the same as it had been for the past ten years. Entertainment continues to be dominated by monopolies of Anglo-American production companies. The domination of these new technologies by the market assures that to a growing degree, the profit making entertainment industry in the Anglo-American world will control what is seen around the globe. *Scenario 2. The Pandora Scenario:* This scenario looks at the worse possible case in terms of the inherent dangers of technological determinism. Barber envisions what may happen if government consciously sets out to utilize technology as a means of standardization, control, or repression. With credit and insurance organizations accumulating huge information files on clients, there are driving factors that make this scenario plausible. here is high cost to privacy. This world measures the potential for monopoly and control over information and communication and new technology can become a dangerous facilitator over tyranny. Technology in itself cannot corrupt democracy, but its potential for benign dominion cannot be ignored. *Scenario 3. The Jeffersonian Scenario:* This is a world in which the new technologies, in themselves, can offer powerful assistance to the life of democracy. A free society is free only to the degree that its citizens are informed and that communication among them is open and informed. According to Barber, this scenario out of the three, is the least probably and "in this sense, a guarded optimism if possible about technology and democracy, but only if citizen groups and governments take action in adapting the new technology to their needs." Examples are using the new technologies such as the interactive capabilities of recent television and Internet technology for civic education or using electronic communication to overcome regional parochialism, local prejudice, and national chauvinism. "Technology has made the metaphor of the global village an electronic reality."

Visions of the NII: Ten Scenarios **Error! Reference source not found.**, 1998

The National Information Infrastructure (NII) is an evolving set of information access, information sharing, transactional, and interpersonal communications networks and information resources that will enhance the working and personal lives of all Americans. This White Paper illustrates some uses of tomorrow's NII, and outlines ten scenarios which accompany underlying technologies that are required to work together to make these scenarios possible. *Scenario 1. "Homing" From Work:* A day in the life of Rita Randolph tending to family emergencies using video cam on her desk computer at work, voice commands, a home-control map, panels for intelligent home appliances. *Scenario 2. Businesses United:* A day in the life of Fred, a corporate manager. Technologies utilized to connect companies together using multimedia and interactive email,

coordinated screen displays between distant computers, smart online information services, customizable and intuitive user interface and virtual networks. *Scenario 3. Home Entertainment, Information, and Shopping:* A day in the life of Ron, who took an early break from work to enjoy his home entertainment systems. Technologies utilized to maximize entertainment, information and shopping at home: video on demand in selectable qualities, wall-sized, flat, high-resolution video, high bandwidth for visually oriented shopping and games, customized information presentations, new service retrieving, home shopping at electronic shopping malls. *Scenario 4. Intelligent Transportation Systems:* A day in the life of Paul, a salesman, who needs to navigate the intelligent transportation system to get to an early morning meeting. Technologies utilized to maximize efficient transportation: intelligent highway systems with video surveillance cameras and roadway sensors to collect information; traffic management systems; ubiquitous wireless networking for voice, data, and video. *Scenario 5. Senior Citizen Use:* A day in the life of a retired grandmother relying on "televisits" to see her grandsons from across the world. Technologies utilized to maximize effective communication systems among the elderly: High two-way bandwidth supporting videoconferencing; immediate access to essential services providers, such as doctors, with strong privacy protection capabilities; large-screen, high-resolution computer displays; limited speech recognition to control telecommunications services, especially for emergency access. *Scenario 6. Starting a Business:* A day in the life of a couple deciding to launch a small business they'd always dreamed of - multimedia games over the NII. Technologies to maximize the "virtual": government databases providing both information and services on an immediate basis; regulatory environment allowing online interstate registrations, online legal services, and worldwide protection mechanisms for intellectual property; high bandwidth supporting visual communication; human, as well as machine, information specialists to help individuals locate and use electronic information resources; multimedia information sharing and interpersonal communications. *Scenario 7. Middle School From Home:* A day in the life of Pauline, a ninth grader, using the school network on the NII to enhance her logical thinking skills on algorithms, abstraction principles, and programming techniques; computerization and data networking in schools, with high-speed connecti into the NII and GII; audiovisual personal computers. *Scenario 8. Telemedicine:* A day in the life of Dr. Sendak, working through telemedicine to enhance visualization tools to convey key concepts in pathology, clinical experience, and conventional and experimental therapies. Key technologies that enhance tele-medicine: High-speed networking for videoconferencing, large file transfers, and real-time computer visualization of data; networked supercomputing resources for medical and educational applications. *Scenario 9. Government Services:* A day in the life of Dan, an unemployed programmer using government services on the NII to take care of his drivers license renewal and job searching. Technology requirements for effective job searching (and interviewing on-line): Networking capacity and services for videotelephony, multimedia e-mail and file transfers, and authentication and security functions; high-speed networking for video communications and large file transfers; identity verification by voice ; speech recognition systems; extensive databases of government information available to the public with easy-to-use navigational capabilities. *Scenario 10. Law Enforcement:* A day in the life of officer Gutierrez who stops a speeding vehicle through an intercar

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emergency intercom and through technology, arrests the driver, wanted for armed robbery. Technology supportive of effective enforcement: Wireless networking, both terrestrial cellular in populated areas and by low-earth-orbiting satellite in sparsely populated areas, with capacity adequate for emergency video and image transmission; visual databases with visual pattern-matching searching in high-powered computers; linking of law enforcement databases, with policy-based restrictions limiting content and access; widely deployed videotelephony services; and voice interaction with communications equipment and networks.

General Motors' White Paper: Perspectives on the Future of Transportation in the Age of Information Workshop Institute for the New California, 1997

This paper was prepared for "The Information Age and the California Infrastructure" Workshop
Institute for the New California, San Francisco, 1997. Within the next 20 years, the United States and the world will undergo unprecedented change. Some of the key forces driving change include: explosive growth of computing; accelerating technology; globalization; urbanization; increasing access to consumer goods; enhanced transportation systems; and growing disparity in lifestyles between knowledge workers and the educationally disadvantaged. The authors believe that all these forces will significantly impact the mobility of people, goods, and information - which in turn will profoundly influence how the personal transportation industry develops in the 21st century. By developing a range of scenarios, General Motors has created an "early warning system" to alert the company to potentially significant future events. *Scenario 1. Technology Reigns:* "In a world where technology reigns, society's needs can all be met through technological solutions. Innovations in vehicle technology and roadway infrastructure have led to decreased travel time and improved satisfaction with vehicular travel - despite increasing numbers of vehicles on the road. The information superhighway is well-developed, and people have the ability to communicate at any time from any location. The personal computer is just that - a "personal" device carried by each individual for communication and information needs...Virtual meetings are common and society is paperless, cashless; technology creates new employment opportunities and knowledge workers do most of their work activities from home. *Scenario 2. Momentum:* "In a world of momentum, society continues to build on the technology developments of the last decades of the 20th century. Innovation flows along expected avenues. In fact, technology is harnessed to protect the status quo of American lifestyles. People are able to maintain their traditional consumption patterns without detriment to the environment. Society continues to be mobile, and people are slow to substitute virtual for real. In fact, slow-to-change social habits inhibit the introduction of radically new technology. Developments in information technology impact transportation systems, but the primary emphasis is on transactions between vehicle and information provider; automated highway system technologies are coming along more slowly. Heavy industries continue to move offshore, but are being replaced by higher-value industries that require an educated work force." *Scenario 3. Environmental Domination:* With global warming no longer a theory, the environment takes center

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stage and dominates all other social and economic influences. The serious environmental situation drives every decision in both the public and personal arenas. Given the bleak environmental outlook, our values and culture undergo fundamental change. Support is universal for stringent environmental regulations which require sacrifice on the part of all. Consumption is now viewed as extravagance, and people scale back their desire for physical goods. People move closer to urban centers and locate near public transportation nodes. Pressures against commuting and extraneous travel have caused a boom in the virtual mobility industry. European-style, high-speed mass transit gains public support in the U.S., while personal vehicles and the fuel they require are taxed at a high level. In this world, the automotive industry sells transportation rather than vehicles. Industry ownership of vehicles ensures regular updating to more efficient powerplants and systems and recycling of used materials and fluids." *Scenario 4. Geopolitical Realignment:* "The future is a whole new world, as economic factors drive the formation of new geopolitical trading groups. The actions of
governments are increasingly influenced by trade considerations, and the world is moving toward one global economy. Driven by business interests, peace breaks out throughout the world. Geographic and political barriers are diminished, with information flowing easily across borders. As the population continues to expand, many cities become megalopolises requiring large-scale mass transit systems. Even so, personal vehicles remain very much in demand. These are of varied size and utility, depending on the needs, desires, lifestyle, and geographic location of individual consumers. Fuel prices are relatively inexpensive; however, alternatives to petroleum are used increasingly. With the need to protect the environment and resources, the trend is toward smaller, more fuel-efficient vehicles. Many cities have green regions, which limit vehicle access or allow only zero-emission vehicles."

Creating the Future: Scenarios for the Digital Economy Innovators of Digital Economy Alternatives, Simon Fraser University, 1998.

In conjunction with the support of the School of Communication at Simon Fraser University, IDEA - Innovators of Digital Economy Alternatives are a team researching the future opportunities and obstacles that may arise from the adoption of digital commerce technology, specifically: digital cash, smart cards, home banking and other possible future technologies for the purpose of enhancing strategy. *Scenario 1. Centralized Power "Corporations Rule":* (driving forces: immigration, age, increasing corporate power; financial convergence; on-line banking; traceable cash technologies). " In the year 2020, we foresee that the steady influx of immigration will result in large ethnic communities. Aged baby boomers (75+) will also need to be considered, as they will constitute a large share of the population. Generation-X (now 40+) and Post Generation-Xers will be the population most adaptable to technological innovations and changes.
 There will be a convergence of financial institutions and technology. This will be accomplished by financial institutions developing their own software. Types of technologies will include smart cards, where all banking information is contained in a

microchip on the card, and consumer databases. Since financial institutions will be the driving force behind developing digital cash and their systems, the control of cash will be in the corporate sector. This may even result in different networks developing different forms of e-cash. With the decrease in government power, organizations may be the only source of financing for social housing or other programs like daycare, even education and health. *Scenario 2. Decentralized Power: Crypto-Anarchy:* (driving forces: decreasing regulation and increasing power of the individual - corporations cater to individual consumer software needs; technology gears toward personal information management). "This is a future of Decentralized power, in which the government disappears on a federal level or is so weakened that it becomes nothing more than a figurehead. Regulation is minimized and the individual has power and freedom of choice. Individuality thrives as social and political interest become unimportant. There is a widening divergence between the information have and have-nots, increasingly marginalizing the "lo-teks" in society. Digital cash is the predominant means of exchange. Due to the anonymous and untraceable nature of digital cash it has become impossible to track the income of individuals. Income tax has been abolished in favour of taxes at point of sale and on physical assets. Large corporations have disintegrated and the commercial sector is dominated by highly competitive, specialized companies who cater to the needs of the individual, supplying primarily innovative technology and software. With the disintegration of large corporations and the fragmentation of financial institutions, decentralized cash systems threaten to obsolesce financial institutions completely. *Scenario 3. "Third-Sector Ecotopia":* (driving forces: community leadership, community power). Issues concerning the collective health of the public take precedence. Environmental concerns and a decline in work available from manufacturing due to high technology combine to create an economy where the non-profit sector will supply the majority of social services. Federal governments become less responsive to the needs of individual communities; decision-making and social services are decentralized to smaller regional/provincial governments and local councils; electronic networks facilitate some form of more participatory democracy. Businesses are more accountable for their social and environmental role in society: manufacturing, construction, distribution of consumer goods with a minimum of environmental impact. Basic level of computer network (Internet) access is maintained through corporate and tax subsidy as a public resource. Public information kiosks; emphasis on technology in education.... Need will arise for a service-based workforce experienced with public relations, to develop flexible, responsive services to community members.

The Museum of Nanotechnology WIRED NEWS, 1998

Tiny and Great Leaps for the Human Race. The Units of Nanotech: 1 millimeter = 1/1000th of a meter : 1 micron = 1/1000th of a millimeter : 1 nanometer = 1/1000th of a micron. *Scenario 1. Biological Ram Chip:* "Developed in 2005 by BioDevices Inc., based in Mountain View, California, this chip was the first commercial use of an organic compound for data storage. "Biological sludge" consisting of a crystalline

protein was chemically tailored to bond onto access points on a RAM chip. The sludge accreted in 10,000
additional layers, and each layer stored almost as much data as the original chip. The finished product was able to hold 10 Gbytes. *Scenario 2. Nanoscale Braille:* " In 2005, a Dutch-U consortium perfected
the application of "bumps" of atoms on an ultrasmooth surface to represent bits of data - creating a revolutionary new storage medium. A massive array of 10,000 tiny, independent mechanical probes scanned the surface, reading data and moving it from one location to another. Each bump of data was about 30 nanometers wide, allowing a single square centimeter to store around 10 Gbytes. *Scenario 3. DNA Data Storage:* "In 2010, Living Logic Systems of Minneapolis marketed the first cost-effective DNA memory device (a simulation is shown here). Using a technique pioneered 15 years earlier at New York University to force the normally single-stranded DNA molecule to branch into six strands, Living Logic created crystalline DNA: huge arrays of cube-shaped cells, linked like a vast jungle gym. Clusters of copper atoms were attached to each cell in the array, and data was stored by attaching electrons to the clusters. The final result? A chunk of branched DNA about the size of a sugar cube that could store almost 10 petabytes (10 million billion bytes) of information. *Scenario 4. Asteroid Terraforming:* The asteroid shown at left is being reworked by preprogramme nanoscale robots to create a fully equipped space habitat for human colonists. The robots were sent out on a conventional rocket that crash-landed on the preselected asteroid. After the nanosystems used indigenous carbon and metal ores to make billions of copies of themselves, they set to work converting the asteroid. When human colonists arrive, they will find comfortable residences ready and waiting. Since this initiative began in 2050, almost 5 million people have relocated to the asteroid belt. Already we are seeing a new generation that has never experienced life
on Earth. The article continues with three more scenarios: Anti-Cancer Nanomachine; Space Beanstalk; and Multifunction Moleculor Manipulator.

4.4 Demographics and Human Resources

Three Scenarios of World Population Growth United Nations World Population Program, 1998

The earth's resources, natural systems, and human population are inherently connected. There is a basic philosophical division in the study of population and environment that is often characterized as a debate between optimists and pessimists. Optimists believe that people have the creative capacity to overcome potential environmental harm resulting from a growing population and intense economic activity. Pessimists foresee potential political, social, and environmental deterioration and collapse. The United Nations World Population Program developed projections of three population trajectories from 1950-2150. *Scenario 1. The Low Trajectory* forecasts world population at 6 billion in 2025, 8 billion by 2050; then down to 3.6 billion by 2150. Potential forces driving this

projection depend primarily on trends in fertility rates in major world regions. There is plausibility for both the low and *(Scenario 2.) The Medium Trajectory,* since fertility rates declined in less developed countries from 6.2 children in the 1950s to 4.3 children in 1997. The U.N. projects that total fertility rates will decline on the over all to 2.1 by 2050, which will involve rapid declines in the world's poorest regions. The Medium Trajectory forecasts world population at 8 billion in 2025, 10 billion by 2050; then staying level at 10.8 billion by 2150. *Scenario 3. The High Trajectory* forecasts world population at 10 billion in 2025, 12 billion in 2050; then 27 billion by 2150. Today, world population momentum adds 80 million people per hear. Most demographers expect fertility to decline in less developed countries as it has been declining in developed countries, but the pace of that decline may hinge on a number of social, political, and economic factors that influence the motivation and ability to limit family size. It is hoped that leapfrogging technologies and the education of women remain a bedrock to fundamental fertility decline.

Social Science and Public Policy -- Future of Homelessness - Three Scenarios and Their Implications Hambrick Jr, Ralph S; Johnson, Gary T, Society, 1998.

The past decade has made clear that homelessness is not simply a passing phenomenon. Many professionals working with the homelessness problem realize that it is necessary to turn the corner from a temporary, emergency response to a long-range strategy. Both social responsibility and realism require it. After a series of interviews and observations in more than twenty cities and localities around the country, Hambrick and Johnson wrote this essay containing three scenarios on the future of homelessness. *Scenario 1. Homelessness Routinized:* In this future, homelessness becomes a routine part of the social ad political landscape. An earthquake or hurricane metaphor no longer applies because homelessness is no longer considered an emergency. Clearly, the expectation of a quick cure in this future has long since disappeared. Just as the "war on poverty" is no longer much of a war, homelessness is no longer considered much of an emergency. Indicators of the "normalization of homelessness" abound on the professional and institutional scene. Health outreach and clinics targeted to the homeless are well established. Yet, many homeless reject shelters as too rule-bound and restrictive, continuing to live under bridges that some consider, should be their official address. The Bureau of the Census struggles with how to treat the homeless population in preparing for the 2010 census. Efforts to coordinate organizations are mixed and ineffective. The police "sweep" the streets, but the homeless are generally "recycled" from shelter to transitional housing to subsidized housing multiple times. Tension characterizes the relations between the homeless and society. *Scenario 2. Homelessness No Longer a Problem:* In this future, homelessness is not longer an issue. Scholars have turned their attention to why it declined so greatly and found a variety of factors: some resulted from policy changes while other factors were less clear. One factor credited was the general health of the economy in 2010. For example, the 32 hour workweek has more evenly

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distributed work opportunities. A way to value less skilled labor played an important role. Many of the barriers to employing individuals for personal service were removed. Reversing the long trend of technology and complexity to push those with low educational level out of the work force, a comfortable co-existence seems to have developed. The well to do are increasingly likely to hire individuals to provide personal services. And, there is a renaissance of personal service entrepreneurship including both the skilled and the unskilled. A complementary development has been the substantial use of "temps" in almost every occupational category. *Scenario 3. The Homelessness Problem Worsens:* In the first decade of the 21st Century, the homelessness problem surpassed anything experienced in the 1980s and 1990s. Two primary forces accounted for this growth: social and economic conditions that produced a larger, more vulnerable population. The economy was strong, but technology made society more and more complex, and it became more difficult for those who were not able to keep up. School systems, with all the new types of changes away from the traditional way of teaching, were routinely criticized for failure to bring all students to an acceptable level of literacy. The disparity led to radicalism and increasing drug use among the youth, and the drop out rate had gone up to 50 percent in inner city schools. A new "culture of poverty" was a contributor to homelessness: poor communities isolated from the mainstream of the economy and single mothers forcibly had a here-and-now attitude, which made it difficult to plan or even perceive the long-term.

Future of Retail – Anderson Scenarios   Jennifer Negley, Discount Store News, May 5, 1997.

The year 2010 is much closer than it seems. A child born today, for example, will be just entering high school by 2010. But in retailing terms, it's got the potential to be as different from 1997 as 1997 is
from 1984. Just how different the retail scene will be 13 years from now is something the think tank at Anderson Consulting sat down to contemplate. *Scenario 1. Mega-Retail World:* "This world is seen as the ultimate one-stop shopping experience where everything is provided in one venue. Consumers spend more time working, but have less disposable income. Electronic and on-line retailing have not really
caught on. consumers want retailing formats to be consistent, reliable and reasonably priced. Each market is dominated by a lone mega-retailer that "does everything to accommodate the shopping experience." Stores, while huge, are easy to navigate, and product information is abundant, much of it provided by touch-screen information kiosks. One-stop shopping reigns supreme. Department stores have added commodity goods, mass merchants have added upscale goods and while there are far fewer stores overall, the amount of total U.S. retail space has remained stable." *Scenario 2. The Main Street World:* "The U.S. population has grown increasingly diverse and the total consumer profile is highly fragmented. Electronic retailing has not been embraced by a significant percentage of households, and while retail stores remain the leading shopping arena, consumers have rejected mass-produced, one-size-fits-all product offerings. They have also abandoned mall shopping and demand the convenience and intimacy of neighborhood shopping. Almost a mirror opposite of the Mega-Retail World, the Main

Street World model consists of much smaller, more tightly niched stores clustered in neighborhoods. These stores are highly specialized, placing a great deal of emphasis on customized assortments and personal service. They use state-of-the-art in-store databases to profile and respond to each customers' habits and needs. Although large retail corporations still exist, their stores have individual identities tailored to the neighborhoods they serve. *Scenario 3. The Technological World:* Technology is pervasive and has been fully integrated into daily living. Convenience is assumed and service becomes a differentiating factor, whether it's delivered by on-line ordering, phone, fax or electronic catalog. Delivery takes a few hours rather than days, and value-added services such as film development and dry-cleaning pickup are part of any local customer's retail service package. Retailers and manufacturers now link directly with consumers, and the winners are those that have developed sterling brand reputations. Retailers have taken private label offerings to a new level through partnerships with secondary manufacturers, and leading manufacturers use the vast amounts of data they have developed on consumers to create well-defined, targeted brands. *Scenario 4. The Retail Web World:* Consumers demand that individual retailers offer them service through a variety of channels, including on line phone, catalog, television shopping and store shopping. Retail stores no longer devote a large amount of real estate to commodities; those are delivered to the home through electronic ordering. Instead, stores have become entertaining and interactive. By controlling the supply chain, retailers use an array of service offerings to build their own brand identities.

Aging in the Next Few Decades Denver Post On-line: Lifestyles health/mind/body July, 1998.

Science cracks the mysteries of aging. As some experts feel will happen in the next few decades - the world could be a different place. The following images of the future accumulate in a scenario of perceptions about the future from experts like Dr. Michael Fossel, clinical professor of medicine and author of "Reversing Human Aging."
Population: "Barring wars, plagues or famines, and if by early in the next century the scientific and medical communities can deliver a treatment that roughly doubles the healthy human life span, the population of any developed nation will double in 75 years. The population goes up proportionately to the increase in life span. Therefore, if you double the life span, you double the population." *Health:* "Some of the most promising research today is looking at aging on a cellular level. But before this work blossoms enough to extend our lives, it may lead to breakthroughs on cancer or improvements on immune system function. In general, though, people will look younger on the outside and feel healthier on the inside much longer; age-related disabilities will vastly decrease." *Economy:* "The rich get richer, the poor get poorer. The disparity widens dramatically in part because cash-smart people have many more years to build their fortunes. -- At the same time, some underdeveloped regions like central Africa flourish as certain diseases are wiped out through this same anti-aging science, allowing these areas to compete with the U.S. and other markets in farming and agriculture."

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Business: "People stay healthy and work well into their 80s, 90s (or even longer as the science is perfected). The result is that companies work overtime to keep their 60- or 70-year veterans who become invaluable experts in their fields." *Military:* It may be tougher to have a war as countries won't want to waste their healthy and priceless 120-year-old citizens. Meanwhile, the 20-year-olds - still well within their childhood in the new life span of the future - won't be as willing to risk everything for their countries. It would be akin to sending 5-year-olds off to war today. -- At the same time, terrorism may be more likely. One reason is that with people living longer, they hold onto age-old grudges longer. The economic disparities mentioned above could spark terrorism. Also, younger citizens in their 20s who can't compete with healthy 100-year-olds in the workplace could become disenfranchised and breed terrorism. *Crime:* Will society be more peaceful or more violent with the incredible changes in life span? It all centers on a debate over wisdom vs. hormones. One theory has it that as people get older and gain more perspective, they are less likely to be violent. Most violent crimes are now committed by people younger than 40. On the other hand, if anti-aging therapies change our hormonal balance to something more like those of current 18-year-olds, future adults may act more like teenagers. -- Prison sentences would need to change. A 20-year-old term for murder won't carry the same deterrent if people are living 50 or 100 years longer than they do now. *Culture:* Styles of music or clothing may have longer shelf lives in the future as older generations hang on to their tastes. *Ageism:* It will completely reverse. As the population ages and the smart get smarter, society won't cherish the younger people as much as it does now. If you're not old and healthy, you're not anybody, may be the new buzz phrase of the 21st century. *Families:* Having children in your 20s or 30s could seem to future people like something you did in your own childhood, before you outgrew it. Nuclear families may lose their importance. At the same time, five- or six-generation families will join for reunions. *Lifestyle:* Younger people may take fewer risks than today's crop of "X-Game" adventurers. Anti-aging breakthroughs will do nothing to prevent fatal accidents. If you know you're going to live to be 150, would you still try hang gliding at 30? *Politics:* As people age, they generally become politically more conservative. As anti-aging breakthroughs lead to grayer and grayer nations, political liberals may lose substantial clout in the world.

The Future of Electronic Education Wharton School of Management, <http:www.rsmcourse.cfm>, 1998.

Today the pieces are in place for the development of a new genre of education: distance learning over the Internet. The technological progress in storage capacity, bandwidth, full motion video and encryption makes the delivery of education a viable means on the "Information Superhighway". Currently, many educational institutions are using the Internet to distribute and enhance the possibilities of a learning environment. However, several key issues currently limit the wide spread growth of Internet based on education: accessibility, bandwidth, certification, greater variety of educational materials, and user responsibility. *Scenario 1. High Acceptance of Technology & Homogeneity Within*

Society: Government administration of standardized tests. A day in the life of a student, Suzy, who scores low in the test; Chelsea Clinton, the Secretary of Education appears in a holographic image recommending that Suzy engage in distance education. In commerce, corporations offer educational services to strengthen skills. Organizations oversee the growth in quality content. *Scenario 2. **High Acceptance of Technology & Fragmentation within Society:*** Privatization of regular schools the previous decade had mixed results. The more expensive schools were doing quite well, especially the ones run by the big three educational companies, but they were too expensive. The non-profit schools were very ideologically bent. The compromise in this scenario is the new government distance education program, providing technology that enables a holistic learning environment. Within the government program, students could choose from a variety of courses: from arts & entertainment to math and engineering. *Scenario 3. Low Acceptance of Technology & Homogeneity Within Society.*

Data Collection

My work with the Millennium Project was support for their research, therefore the conclusions and theses that are presented in the 1999 State of the Future are completely attributed to the Millennium Project. And yet, an integral part of the Millennium Project was the data collection and entry by Millennium Project participants.
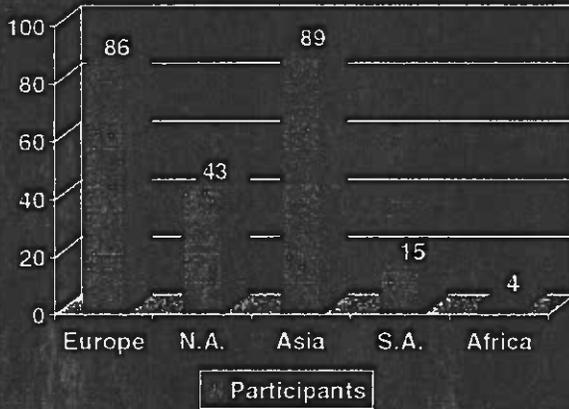
5.1. Participants

The participants were identified by the executive directors, Jerry Glenn and Theodore Gordon. An accurate sampling of the world's population and top future thinkers was the aim in selection of the participants. The total number of participants in the 1999 questionnaire/interview was 241 people. These participants came from the following countries: United States, Australia, Argentina, United Kingdom, Russia, Iran, China, Egypt, India, Central Europe, and Japan.

5.1.1. Regional Demographics

The following chart gives a more detailed analysis of the regional demographics of the 241 participants. 86 participants are from Europe, 43 in North America, 89 in Asia, 15 in South America, and 4 in Africa.
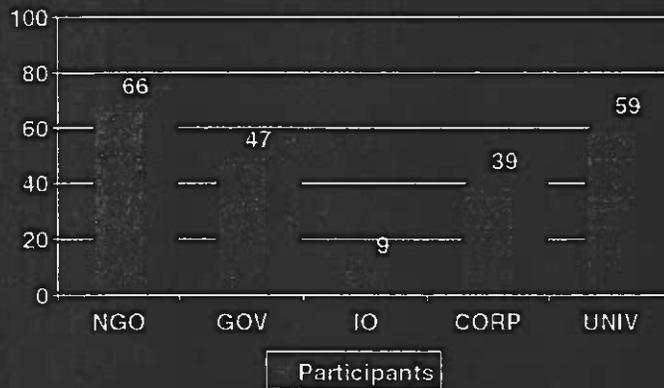
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5.1.2. Sectoral Demographics

The following chart shows the sectoral demographics of the 241 participants. 66 of the participants were from non governmental organizations, 47 are from the government, 9 are from international organizations, 39 are from corporations, and 59 are from universities.

5.2. Method of Data Collection

The modern rebirth of futures research began with the Delphi technique at RAND in the early 1960s. The questions of Rand thinkers, at the time, primarily dealt with the military potential of futures technology and potential political issues and their resolution. RAND's interest in developing systematic methods for forecasting apparently legitimized the field. Since this first Delphi, literally thousands have been performed on topics as wide ranging as the future of religion and the family to space exploration. Because the number of respondents is usually small, Delphis do not produce statistically significant results; in other words, the results provided by any panel do not predict the response of a larger population or even a different Delphi panel. They represent the synthesis of opinion of the particular group, no more, no less. The Delphi method is performed by selecting participants who are knowledgeable in the particular field that the study is in. Questions are asked via interview or by questionnaire. According to Thoedore Gordon, " Our experience indicates that a response rate from 40 to 75 percent of the participants can be anticipated. The turn around time is on the order of weeks, no matter what the medium of communication."

5.2.1. Interview and Questionnaire Sample

The Millennium Project sent out a questionnaire for Round 3 (1999), which is attached. The questionnaire is provided, compliments of Mr. Jerome Glenn, executive director of the Millennium Project, Washington, D.C. The Millennium Project retains all copyright laws.

5.2.2. Database Entry: Questionnaire Results

My first month at the American Council for the UNU, I was assigned the task of data entry into a Lotus123 spreadsheet. The following is a sample of the respondents and the type of data layout which I worked with. Following these first two questions is an analysis of questions 1 and 2, provided by the mathematical computation of the computer software.

RESPONDENTS

Respond-ent Region Institution	Rodney E GOV 1	Lemire NA 2	Linstone NA NGO 3	Draggan NA GOV 4	Henderson NA CORP 5	Uda A 6	Francis E CORP 7	Rausch NA 8	Malaska E UNIV 9	Page E CORP 10
Question 1										
22	3	3	4	5	4	4	4	2	2	3
23	4	5	3	3	3	4	4	3	4	3
24	5	4	3	4	4	3	3	3	4	3
25	5	4	4	5	4	4	3	4	3	4
26	4	3	3	4	3	3	2	3	2	5
27	3	2	4	1	4	3	2	4	4	5
28	5	5	3	4	5	4	3	3	4	4
29	4	3	3	4	3	4	3	3	3	4
30	4	2	2	2	4	4	3	4	4	4
Question 2										
17	5	5	4	4	5	5	4	4	5	4
18	3	4	4	3	5	3	3	4	4	5
19	5	3	4	2	5	3	3	3	3	3
20	3	4	3	2	5	4	2	4	4	3

ANALYSIS SECTION

Question 1

Additional Impediments	AVG
22. Responsibility: personal desire to avoid responsibility for decision making; not wanting to rock the boat.	3.414
23. Inadequate intercultural communications and media exposure.	3.042
24. Lack of tools for integrating future estimates into daily decision making.	3.2
25. Absence of a sense of urgency; thinking that someone else will take care of it.	3.4
26. Benefits of taking action not clearly articulated.	2.814
27. Lack of rewards for action that pays off in the long term (vs. short term rewards).	2.986
28. Paradigm lock: not being able to see or accept that there may be a >completely different world view	3.594
29. Over focus: picking a small do-able project at the expense of the bigger picture.	3.235
30. Influence of prior mistakes made by other powerful actors, e.g. international institutions like the IMF, the UN agencies, powerful states influencing policy in other countries.	3.277

Question
2

New Suggestions About Information Leading to Decision Making

	AVG
17. Knowledge about what is possible: how science and technology might affect the outcomes of decisions	4.077
18. Information about how a contemplated decision may affect stakeholders	3.677
19. Education of decision makers and opinion shapers on issues of long term significance, rather than those of short term populist interest	3.906
20. Clarity of forecasted condition without action and technical feasibility of proposed action	3.41

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Issues, Opportunities, and Challenges

In 1997, over 300 futurists and scholars identified 15 issues that the world will likely be facing in the future that they feel are important. Then, in 1998, this list was distilled into 15 opportunities which the same futurists and scholars identified as being available to policy makers and decision makers. In the 1999 internal working draft, 15 challenges have been identified. The challenges identified by the participants with the participants' comments on each challenge is included in the <u>1999 State of the Future Report</u>, and provides the reader with a global perspective of the challenges which await humanity in the next millennium.

6.4. Challenges Assigned for Update

At the start of my internship, there were a total of five interns (myself included). Two weeks into my internship, the other four interns all received job offers at other locations, which left only myself as an intern with the AC/UNU. The work-load of all four interns was then divided between myself, my supervisor, Elizabeth Florescu, and the executive director, Mr. Jerome C. Glenn. The following list of challenges were given to me to update and edit for the 1999 text:

- **How can sustainable development be achieved for all?**
- **How can everyone have sufficient clean water without conflict?**
- How can population growth and resources be brought into balance?
- How can the threat of new and re-emerging diseases, and immune micro-organisms be reduced?
- How can the increasing autonomy of women and other groups be protected and promoted to improve the human condition?
- How can the growing energy demand be safely and efficiently met?
- How can scientific and technological breakthroughs be accelerated to improve the human condition?

The above highlighted challenges are provided in this report with the permission of the Millennium Project's executive director, Mr. Jerome C. Glenn. The Millennium Project retains all copyright privileges.

6.1.1. How can sustainable development be achieved for all?

Unsustainable growth may well be the greatest threat to the future of humanity, since the danger of nuclear Armageddon during the Cold War. The world is increasingly aware of the adverse interactions between population and economic growth, on the one hand, and environmental quality and natural resources on the other. As a result, the majority of political and intellectual leaders around the world acknowledge sustainable development as the top uniting goal for humanity.

Although the term "sustainable development" (popularized by the Brundtland Commission in its 1987 report, *Our Common Future*), focused on environmental sustainability, the concept really has four interdependent and necessary elements: financial, economic, environmental, and social.

Many in the post-communist and poorer regions see the environmental element as peripheral to their daily struggles, even though the awareness of the need for environmentally sound economic growth is pervasive and growing. The World Trade Organization is poised to become a force for more sustainable trade practices and the Montreal Protocol is acclaimed as a success. Even though the Kyoto Summit on Climate Change showed a fundamental splint between the first and third worlds on implementation, developing countries have begun to voluntarily sign the UN Framework Convention on Climate Change that would require that they too cut greenhouse gases. (This protocol calls for industrialized countries to cut their greenhouse gas emissions on average by 5.2 percent from 1990 levels.)

The Third World argues that the First has already developed to a plateau that will allow them to cutback on emissions and that First World development processes have already contributed the majority of greenhouse gasses. The Third World has not yet reached that plateau of development. Limits on emissions during the early development process have a different economic impact than limits during the more mature development plateau. Limits can be equally applied when nations have equal development. Limits help insure the First World's stability, but can prevent the Third World's growth. But a deal can be made. The Third Word wants insurance that they will have the technology (through technology cooperation, loans, and grants) to achieve cleaner economic growth, then they will agree to limits. After all, the developed countries consume far more raw materials and energy than the poorer countries are expected to do throughout the next century.

The world population is currently about 6 billion. According to UN medium projections it will reach 8.9 billion by 2050. The population rates are falling rapidly in most of the developing countries, while they have declined to zero in most of the developed regions. Although the population growth rate is slowing, the numbers of women entering child bearing age is the greatest in history. According to the UNFPA, about 45 percent of humanity now lives in cities, and as urban population increases, urban environmental problems will intensify as well. Population growth is growing the most where people can least afford the necessities of life.

Faster economic growth is expected in most countries, which will lead to increased consumption of natural resources. Most of the world's fisheries are already in danger of depletion. World energy demand is expected to increase 50 percent by 2020. During the same period, more than 300 nuclear power plants must be decommissioned. As a result, more new sources of energy will be required than many expect. China and India are expected to turn to coal, adding appreciably to air pollution and global warming. The 1996 Intergovernmental Panel on Climate Change concluded that "The balance of evidence suggests a discernible human influence on global climate." [ck: the ten highest annual temperatures of the earth have occurred in the past eleven years.] Increasing global temperature changes weather patters and flooding of coastal areas. Fundamentally

more menacing than this is the possibility of the "run away" greenhouse affect: slow increases of temperature eventually leading to an acceleration of temperature increases.

Many countries have demonstrated that energy consumption need not grow in direct proportion to economic growth, and UNCED has concluded that economic growth is necessary for reversing environmental damage and finding resource substitution.

The interdependence of economic growth and technological innovation has been the most significant engine for change for the last 200 years. Economic growth is responsible for changing the standard of living for most people in the world, as well as reshaping the physical and social environment, creating new global business relationships. Growth has changed the nature of work, and altered expectations about the role and responsibilities of governments.

Many problems have accompanied this growth, including unemployment due to restructuring, widening income gaps, trade disputes, increased energy consumption, political disorder, environmental degradation, migrations from lesser developed countries, technological displacement, conflict between social and economic aims, and uneven distribution of wealth among nations. But others point to more positive trends, such as the increased production of employment, food, shelter, clothing, health care, knowledge, and tax revenues for governments' social programs. Economic growth has also helped to create the financial resources and new technologies needed for improved environmental management and global information access. During this period of economic growth, infant mortality has fallen, life expectancy has risen, and living standards for 3 to 4 billion people have improved.

The globalization and liberalization of national economies promises to accelerate the forces of global economic growth. According to UNCTAD's World Investment Report of 1997 [update date and include Asian Financial crisis trade impact], there are over 44,500 transnational corporations operating in the world, up from only 7,000 in 1970. The combined revenues of General Motors and Ford is greater than the GDP for all of Sub-Saharan Africa. The WTO's International Trade Trends and Statistics Report states that in 1995 "the volume of world merchandise exports expanded at its fastest pace in nearly two decades." The increase in trade was nearly triple the growth in output in 1994 and nearly triple the growth in 1993.

UNCED in Rio de Janeiro concluded that the link between economic growth and environmental degradation is unquestionable. It also concluded that sustainable forms of economic growth are necessary for the resolution of environmental problems because solving these problems will be very costly requiring technological innovation. International cooperation among ecological research centers with standardized data protocols and integration of global environmental research and satellite data are making it possible to model and monitor the earth-as-a-whole. Such a global system will be necessary for contemporary generations to meet their needs without hindering the development of future generations. Ecological conditions have improved where vigorous environmental protection programs have been implemented. Although the concept of

environmental, economic, financial, and social sustainability dominates the policy dialog, agreement about policy implementation and behavior change are lagging far behind. There is an unprecedented opportunity to galvanize global opinion into actions. Sustainable development could become the third "global revolution" after the agricultural and industrial revolutions.

ADDITIONAL INTERVIEWEE COMMENTS

It is unreasonable to expect the achievement of sustainable development without crises in the relationships among technology, economics, social systems, and ecology....After the Amazonian rain forest, the Congo basin will be the next focus for such trade-offs to be considered... International strategy for sustainable development is hampered by institutional and contractual problems related to international law, social structures, and jurisdictional difficulties within the UN system. Greed makes it unsustainable in developed countries and poverty makes it so in developing countries...

The EU has made great advances by recognizing Agenda 21 and introducing sustainability policies in transportation, agriculture, energy, tourism, and industry. Italy has introduced occupational and economic benefits through the development of technological innovation and environmental policies such as the destruction of cars older than 10 years, recycling (paper, glass, and plastics, and protecting Natural Parks)...China's forest coverage has increased 1% between 1985 and 1995 due to a large-scale reforestation campaign during this period [call embassy and update].... Anhui Province, in China, has reforested the entire province in 8 years. It closed 475 enterprises that seriously polluted the Hui River in 1996. By the end of 1997, 229 of these had completed their pollution control, 49 were still constructing pollution control facilities, and 30 were permanently closed or switched to a new industry [update from Zhao]...

When corporations' stock price is affected by their impact on the environment, then you will see corporations change more dramatically. If corporations were listed high or low for their exposure to environmental liabilities, then stock prices could be affected...

Too many government policymakers are unqualified and make disastrous decisions based on myths that contribute to ecologically dangerous areas. One myth was that the biosphere can only handle 1 billion people - but this depends on what the people do. Another was that natural resources limit evolution - but novel technologies have beaten environmental limits and new ones will be more efficient, place less demand on natural resources, and prevent pollution. Linear Industrial Age thinking also leads to these mistakes....

The most significant area in which sustainability is and will remain a problem is the health care sector. Quality health care is essentially becoming a human right all over the world...

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As people's wealth rises, pollution increases, but as wealth increases, further pollution per capita drops because people can pay for solutions. Waste is increasing rapidly, but this problem is solvable ultimately.... Carbon dioxide looks like the longest term problem.... There is almost infinite substitutability. So the price mechanism will drive markers to the alternatives.... This "environmental Kuznet's curve" hypothesis is disputed.... The problem now is not non-renewable, but renewable resources, such as fish (in the global commons), food, etc.... Although pollution would probably increase with rapid economic growth in Russia, the reverse is not true. Pollution continued even when our economy shrunk, owing to lack of control of industry and old technology....The US spends five times more on defense than environment; Russia spends 50 times more.

No government can meet its sustainable development goals unless it attracts foreign capital.... Without growth, billions of people will be condemned to poverty....We need a global agreement that the elimination of poverty by economic growth is the top priority.... Government should support development of new zero (or low) emission technology.... The debate between the market approach versus central economic planning is over; now the question is how best to make the market work for sustainable development in an increasingly global economy....The conflict of economic growth and environmental quality will get worse unless human behavior changes.... Poverty is the main cause of environmental degradation.... Negative consequences of growth have happened throughout history and new forms of self-organization have emerged to address them....

Economic growth is necessary to address all the other issues in this book, but it must be sustainable economic growth created by: 1) sound macroeconomic policies; 2) financial policies that include environmental costs as reoccurring costs; 3) environmental policies that manage natural resources and pollution - sound environmental policy is sound economic policy, as was concluded at UNCEDC; and 4) transparent social policies that foster equal opportunity, choices to improve conditions for oneself and family, sensitivity to cultural differences, and increased social stability.

SUGGESTED ACTIONS TO ADDRESS THIS CHALLENGE WITH A RANGE VIEWS:

About a third of the actions suggested below repeat and hence reinforce those covered in Agenda 21. The new suggestions can be thought of as being complementary to Agenda 21. Additionally, this section adds to the sustainable development discussions a distilled range of thinking that can help identify areas of agreement for action. Implementation of Agenda 21 is lagging far behind what was anticipated in Rio in 1992. But that does not mean that Agenda 21 is dead, that its goals are invalid, or that its steps to sustainability are wrong. The great coincidence of Millennium Project's present list of suggested actions with Agenda 21 proves the contrary.

1.1 Create (via UNEP, ICSU, and possibly WTO) international scientific boards to define terms, standards, and measurements necessary for commonly applied environmental policies such as tax incentives, labels, and others listed below. Begin

with the easiest standards such as protection of resources like forests and fisheries, and replacement of depleted stocks.

This is critical for real collaboration... Since the use of labels for products is effective, it is essential to work out common international criteria.... Maybe IPCC can do this, but it will be hard to get global agreement. Use teleconferences, or Internet... We should also define the economic value of watersheds, forests, etc.... WTO should create and enforce environmental standards in trade. Developing countries will see this as a new form of protectionism. UNEP should do the research but would need a new treaty to have enforcement powers. In the meantime, WTO is the only potential leader to enforce results of such research... Theoretically it is a good action, but in practice, the standards that are acceptable for USA or Germany are not acceptable for Russia, China or Latin American countries. It is not possible to change the technological base in these countries immediately...

1.2 Governments, in cooperation with international organizations, should encourage nations, perhaps through treaties, to abolish environmentally inefficient subsidies.

This will work once an international consensus is reached on the definitions of environmentally inefficient subsidies.... It is essential to eliminate subsidies.... Our government would like to cooperate on this.... This action is difficult to implement, but that is the current direction.... Methodologies for assessing environmental efficiency include "net energy" and "ecological footprint analysis.".... Some believe that changing laws and attitudes are more important than finding new technologies or scientific breakthroughs.

1.3 Government, in partnership with environmental scientists and the private sector, should create taxes or fees for the most environmentally damaging activities. Initiate tariffs and/or taxes on polluting products or technologies, with revenues collected to be used to subsidize the acquisition of environmentally safe technologies; provide incentives for environmentally sound technologies, goods, and equipment.

This will require an international scientific panel to define measures and umpires like UNEP and WTO...NGOs will have to lobby governments to create this via trade agreements...Yes, you have to create the punitive actions to generate the income for the incentives. Governments and corporations should pool money to give grants to create more environmentally friendly products... We should tax resource usage and not incomes. There should be different rates for different energy sources. Full cost accounting should become the norm. It is stupid for government to subsidize tobacco, a single-use plant which has a high impact on the environment and pay for cancer research and treatment, while banning hemp, a multi-use plant with a low impact on the environment...Some preferential measures on tariffs ought to be worked out for developing countries.... It is occurring to some degree now.... There are limited possibilities internationally.... Expensive, developed countries should take the lead....This will work. Our government

has begun, but financial support is too modest.... Phase them in over time; it is dangerous to do it all at once without giving producers time to respond.... Consider other forms of regulation in this package.... Only economic measures are listed. We should add moral and educational actions. Can we, by taxing our activities, change our morality and understanding of the world?.... This should be preceded by getting regulation of the environment correct.

1.4 Governments, with some leadership from the private sector and in cooperation with scientific research, should include environmental costs in the pricing of natural resources and products.

Economic and environmental policy should be created together as a sustainable economic policy. This is very good, but very difficult to implement properly. How do you measure the costs?.... Include the cost in destruction of resources.... Corporations will fight it.... It is partly realized in some parts of our country, and we are taking leadership to continue implementation. It is included in the Annual State Report (Russia) and in the president's decree about the model of sustainable development. But most of the implementation of this action is only on paper.... Governments don't control the prices; the global market and cartels control the prices of natural resources.... Adjust the production systems instead.... This action will kill our industry; it is an absurdity. There is no close relation between pollution and profit.

1.5 Governments, with some assistance from international organizations, should establish a system of national accounts that includes the economic impacts of the depletion of natural resources.

The system of national accounts, which is adopted by about 50 countries today, does not reflect the ecological domain.....A USGS report tried to establish the quantitative basis for such a system....World Bank and the regional development banks that currently train governments in environmental impact assessment could add this element...In Africa, this will require OAU leadership to give mandates to regional organizations like UNECA and ADB for technical assistance and training....Although not organized like this excellent action suggests, some countries have begun policy changes in this direction, such as banning export of some tree species.... There are great difficulties in establishing neutral measures for this.... Instead, consider the establishment of a sustainable development index that takes nature, society, and the economy into consideration.

1.6 Governments, with some leadership from the private sector, should encourage placement of labels on consumer products and information that indicates whether they have been produced in a sustainable manner.

Labeling is good, but difficult for developing countries' trade. Although it seems very reasonable, lower-income countries do not know how to judge this and would need external assistance. The definition and measurements necessary to carry this out are not now possible.... It won't work; it's too easy to exploit labeling for protection of domestic products and discrimination against competing products.... WTO rules need changing to

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implement....Add communications plan to make sure the public understand the labels....It would be too expensive and bureaucratic to label all consumer products, instead encourage voluntary labeling.... Companies should create their own labels, like printing "recycled paper" to promote themselves rather than wait for government to impose labels... Swiss Air promotes its food as being produced by environmentally sound agricultural practices.

1.7 Include sanctions and enforcement mechanisms and procedures with any environmental policy recommendation; e.g. the Framework Convention on Climate Change should include ways to punish offenders.

ECOSOC should lead the policy for socially binding sanctions...The sanctions should be commensurable with compensation for harm. These sanctions should be based on the information of international ecosystem scanning not regulated by countries... The funds raised from sanctions should be transferred to the international foundations to finance environmental programs.... International law is a mix of politics and rules - even the Comprehensive Nuclear Test Ban Treaty is only enforced through appeals to the UN Security Council. It is better to have agreed terms without enforcement powers than to have no agreement.

Fines are the only way to punish offenders. Sanctions against a whole country could be counter productive and punish peoples' development. The Ozone treaty worked pretty well, but there is a black market in CFC's.... Enforcement mechanisms in the WTO and other UN organizations are necessary.... Governments could deny political insurance (OPIC in the US) for businesses in their country working in another country on environmentally unsound projects.... Create positive collaboration and incentives to create a new way of doing business.... Third world engagement is missing.... It is not workable in developing countries that are struggling to generate enough food and jobs.

1.8 Spread ISO 14000 and 14001 to more countries and companies

ISO 14000 is a quality control and performance-tracking mechanism. ISO 14001 is the Environmental Management System (EMS) standard published in 1996 used to help companies create their one EMS to prove environmental sensitivity throughout an organization. Continual improvement of the EMS is enherent in the ISO 14001 concept. Its success will depend greatly on how good the underlying EMS goals - established independently by each participating corporation - are. It has great potential if companies can be motivated to orient their EMS goals by scientifically established international, national, regional, and local priorities. It can also provide a consistent environmental posture for a corporation. ISO 14001 could become an alternative to some government regulations.

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Procedures and methods should be developed to: a) establish such sustainability priorities through scientifically advised, participatory decision-making; b) translate priorities into EMS goals; and c) report and aggregate EMS achievements as a component of community sustainability indicators. Add to ISO 14000 the initiative of the implementation of ecologically sound production or sustainable business frameworks (such as //Ck Hazel's comments// The Natural Step and the Business Charter for Sustainable Development of the International Chamber of Commerce (<http://www.iccwbo.org/Cust/html/The%20Business%20Charter.htm>).

Such frameworks may be seen as complementary to ISO 14000 and also can be implemented instead of ISO 14000. They are non-exclusive, and since all of these are voluntary and quite flexible, their degree of success in each case depends much more on the sincerity and commitment of the adopting enterprise than on specific content and formulation of the framework....ISO 14000 is fully voluntary now. But for those companies that adopt it, it can save money.

Ecological standards should not be common for all, but adapted to countries' conditions... Link to international assistance and relations. Regional banks (ADB in Africa, etc. could do the training but would need political leadership of the OAU.)...This is a good way to track your progress and current situation, but not a good way into the future... Motorola in Scotland realized a cost saving of 2 million per year when they adopted the standard.... Good, but can become also instrument of trade discrimination...

The EU encourages companies to register to ISO 14001 or the European Management Audit Scheme (a standard very similar to ISO 14001). Japan has over 25% of the ISO 14001 registrations worldwide.

1.9 UN organizations, with some leadership by governments, should establish an international technology bank, funded by country pledges, that could acquire the rights to innovate "green" technologies so as to make them more easily available to environmentally less advantaged countries.

The bank should focus first on the most ecologically dangerous regions.... Such a bank should have direct links to corporations.... The first step has been taken with the Global Ecology Fund and with the Global Environmental Facility.... The African Development Bank could open a section to address this issue.... This will work when the problems are considered urgent enough.... Most Chinese people instinctively think that the developed countries' objective in these kinds of issues is to suppress the economic success of poorer countries. For this reason, UN organizations are the best mechanisms to implement this.... Such a bank makes sense, but not under the UN.... Governments should stay away from

control to avoid corruption.... The World Bank, UNDP, etc., have taken some actions in this direction, although it is not very realistic to prevent pollution. Instead, perfect relevant regulations and laws for family planning, natural resources utilization, waste recycling, and environmental protection.

1.10 Further develop models and simulations to forecast potential environmental "hot spots".

This should be developed by the UN Office for Sustainable Development in cooperation with UNEP and results should be reported to the UN General Assembly...The Inter-governmental Panel on Climate Change (IPCC) is doing this. [NASA's Mission to Planet Earth, now called Earth Science, is integrating satellite data with earth-based data to create global models for monitoring changes.]... Yes, but once we get the top 8 or 10 hot spots, we have to get together on the actions and set priorities.

We should develop complex forecasts that take in consideration the nature and the cycle of "hot spots" and have a picture of the future as a whole and point out the "hot spots" as these are manifestations of eco-crises... Use different term than "hot spots." "What if" statements leading to scenarios have more powerful influences on decisions than models.

Developing processes to solve problems is more important than creating models.... Shortage of good science, and accessibility to data prevents its achievement. Environment is also too complex for this.

This action should be linked with forecasts and programs for development. We need goals that are international and national, long and medium- range with special mechanisms for their development and implementation... The countries that might be defined as "hot spots" do not have financial resources for harmonious development. We need international foundations. Not only temporary international foundations to solve temporary/partial problems, but a system of international foundations for early warning and implementation of global, trans-national eco-policies.

1.11 Increase R&D budgets for projects related to sustainable development, possibly with mandated fund contributions by all countries.

Why just governments? Make it a world philanthropic organization that also includes corporate contributions....A Global Ecological Foundation should also support the theoretical basis of sustainable development as well as actions to address hot spots....This foundation might be funded by government contributions calculated proportionally to the GDP and taxes and tariffs as mentioned at action 1.5.... Some countries can't pay, so don't make it mandatory. Use environmental offsets or

incentives for corporations to provide technology to help developing countries leapfrog polluting practices.... Better to lobby governments to promote R&D via tax incentives, than imposing a budget.... The R&D for sustainable development is complex and new, hence, it needs substantial financial resources. Lead by international agency, possibly UNEP.... Skeptical

1.12 Governments, in cooperation with UN organizations, should create tradable pollution permits that regulate global emission limits for countries or industrial sectors.

This is very reasonable and will work once target emissions are established....The Kyoto Protocol agreed to this in principle....The US has successful experience in this with tradable sulfur dioxide credits, which are working very well. Extending this approach internationally is difficult since there are so many different political systems and there are serious equity issues between industrial and developing countries on apportioning permits ...The modalities of the permit mechanism must be carefully tailored to the type of emission and industry, and there are substantial risks in setting quotas and in the possibility of unrecognized loopholes.... A new mechanism - the International Bank for Environmental Settlements - was discussed to provide a framework.... Training for industrialists is essential.....The automobile industry established Partners for a New Generation of Vehicles as a private industry research consortium. Could this action divert funds from consortia like this?.... This won't work until we know what criteria and standards are to be used for these permits and who determines what is polluting and what are the acceptable or tolerable limits.... Make sure this does not favor obsolete plants and technologies that retard innovation.

1.13 Further develop ecologically based agriculture to reduce large consumption of water, energy, and other material inputs in agriculture.

This should be the top priority... Put emphases on efficiency not reduction...This will require radical shifts in approaches. The US and EC agricultural policies are anti-environment and anti-market using heavy subsidies and fertilizers. NGOs should lobby to get new funds for CGIAR to conduct the research necessary for the change as they did with the Green Revolution...FAO should lead...If there is full-cost accounting, then the market will work well. Public/private consortiums might also create new communities that show new practices like China has done.

1.14 Encourage new definitions of wealth that could change consumption patterns.

This is the key action. The economic myth of growth at any cost has to be destroyed and a new image of wealth created and sold by the Ad Council, advertising industry, and media stars is essential to achieve this opportunity...Yes, but not just wealth, we need new vision of world harmony...Even if we change the definition of wealth, there is no guarantee people will change their beliefs and behaviors. How to move from concept to behavior change?...The current market economy system is very imperfect, but we do not have a better system. We need a new philosophy or development, which would help to find an alternative economic system.

NGOs, with some leadership and support from government, should encourage decreases in consumption by industrialized countries. It is best to use incentives, eliminate subsidies, and charge the real cost of resources.... Build a consensus by consciousness-raising activities, as was done with recycling, using a bottom-up approach with individuals, groups, and NGOs.

Consumption patterns are extensively covered in Agenda 21, though not directly in relation to definitions of wealth. This requires a fundamental reform of the world's present monetary system. The goals of sustainability are at odds with a global economy that relies on interchangeable currencies, used not only to facilitate the exchange of goods and services but also as stores of wealth. The "monetary imperative" dictates that the best strategy to achieve financial security is the liquidation of assets when their net present value exceeds their discounted future value. We need a transition to currencies whose issuance is based on the actual provision of goods and services and a strict separation of exchange (trade) functions from capital (savings) functions. Locally controlled currencies will isolate local economies from the socially and environmentally destructive vagaries of global economic swings... See Thomas H. Greco, Jr., and New Money for Healthy Communities, < http://www.ic.org/market/money/index.html > and Bernhard Lietaer, Community Currencies: A New Tool for the 21st Century http://www.transaction.net/money/cc/cc01.html....Ithaca, N.Y. currency system <www.lightlink.com>, LETS (local exchange trading systems) in 20 countries, the Schumacher Society and H.Henderson, Information, the World's New Currency, Isn't Scarce, World Business Academy Perspectives, wba@well.com.....New definitions will not help too much to change consumption patterns.... Changing the definition of wealth is a complex process including religion and opinion makers, not only the "voice of greens", to touch the moral dimension, not only the ecological aspect.

1.15 Encourage ethical discourse to make reasonably clean air, water, and healthy soil a higher value than economic value.

Very interesting new model of valuing the environment... World society is in transition to a new system of values and new ethical norms, but clean air, water and

soil for the human health should be the first priority. All other priorities should serve the realization of this one....Love idea of declaring it a human right. The UN would have to initiate it, but how to get the world to accept it?....Governments have to educate people to understand the environmental facts and impacts. Let the NGOs address the ethics.

Consider corruption in environmental matters as a "special crime" against human dignity... We are now a global people and we need global values. But people don't change because of ethics, they change because of survival. The religious imperative of life should drive religious leaders to provide more leadership in this. Maybe the Vatican should host a world congress on religion and environment to be broadcast on live television during Earth Day.... Maybe 5-7% of the world understands these issues and actions. Such a global religious event would broaden the world understanding beyond this small percent.

1.16 Incorporate the concept of sustainability into educational curricula at all levels; include ecology, biodiversity, preservation of resources, and use informal education materials by NGOs that are increasingly available on Internet.

UN organizations and corporations should collaborate to show a world with sustainability and one without it [the World Commission on Water for the 21st Century with the World Water Vision project of UNESCO are writing these scenarios]....Demonstrate the net benefit of viable alternatives.... Create edutainment and games to teach the public the issues and responsible behavior.... Community education programs have shown that societal attitudes can change quickly (e.g. seat belts, litter).... Disseminate information on consequences. The onus is on those in positions of power to create the opportunities in which people can make appropriate choices... Create a tight focus on the message and include public social marketing as well... UNESCO and UNU should provide some leadership... Old ideas should be changed and the new ones communicated in the primary schools including sustainable development technology and technological innovation.... It is not possible to incorporate the concept of sustainability in the actual educational system. It is necessary to create basically new educational system structure.

1.17 Encourage consumers to purchase from service industries that draw from more environmentally friendly industrial processes.

Agree, connected with ecolabelling.... Consumer unions could share best practices, but who gets to create the seal of approval system?... Leadership should come from Consumer groups and government environmental agencies.... Theoretically it is a good action, but it depends on resources and production tradition, as well as domestic market demand. If very expensive ecologically clean goods are suggested, than only a very restricted part of population will be able to buy it and the corporation will

collapse immediately. Will corporations take this risk?.... Privileges of consumers must be institutionalized.

1.18 Encourage synergy between environmental movements and human rights groups to make clean air, water, and land a human right and increase free flow of information about environmental impacts.

This is related to the previous suggestion of making a healthy environment a human right. Who brings the movements together?...NGOs should lead...Religious groups can use the year 2000 as the focal point for the synergy.... Not only human rights, but all types of organizations oriented on communication with people, such as religious and educational organizations.... It is very important, but it is also very difficult, at least for China. Presently, the only solution is the government action in such countries.

1.19 Governments and international organizations should continue to support and promote all modes of family planning by subsidizing and distributing contraceptives and by promoting programs to improve health care, diminish infant mortality, improve literacy, and involve women in the monetary economy.

In Asia the governments lead this action, but in Africa UN agencies, USAID, and other outside agencies lead because the governments resist birth control....The development of education and the improvement of quality of life are the most effective policies that leads to other solutions. Focusing on these issues, rather than the speed of population reduction, is more essential....There is no substitute for economic growth.....The family is the first institution to protect the environment....There is conflict over giving condoms to children; we don't want to encourage the sexual activity of youth, yet TV programming promotes sexual activity.. Religious opposition and political rivalry prevent this from being more effective....UNFPA should provide leadership.... Since much is going on now, it is a lower priority than the others listed here.

1.20 Develop national laws to compensate victims of pollution and other environmental damage

Very important and should be initiated by government environmental agencies...If full-cost accounting were instituted, than inventors and corporate behaviors will change....Define the concept of an environmental criminal....Punitive systems produce behavior changes, but balance with incentives....Nations acting irresponsibly should be penalized, regulatory and legislative measures are part of the answer, but we should not isolate 'offenders' totally - this only drives them to unsustainable activity.... Is there a leader in the international systems that can create a world fund to communicate to the

customers and provide incentives?.... If sustainability were a brand, what would it look like?....It is difficult or even not possible to evaluate and count specific environmental damages (for example health of people is complex of many factors where quality of environment is just one of them).

1.21 Conduct UN Summit on sustainable development to update progress and establish international laws for sustainable development.

Necessary to get attention.... We have universal declarations and local ignorance. Instead we should have a UN Summit to establish "global laws for sustainable development" that should be implemented by local institutions that are globally oriented and supported by global institutions responsible for environmental protection.... It can not be fully mandated and covered by laws. What gets us eventually to sustainability is trade. We can get there in 25 years everywhere except Sub Sahara Africa, and even there, another 10 years is all that will be required. For Africa, the time is needed to skip a generation of government officials.

It is necessary to develop further Rio Declaration. International Law will gradually absorb principles of sustainability.... It is very difficult to conduct because of the great differences in the development level of different regions.... Wishful thinking.... Some international summits are necessary and may be useful, but the problem is of equivalency and access to information - Internet is very important.

1.22 Create institutions for increased global environment protection; example: The International Court of Environmental Arbitration and Conciliation.

Evolve to a Global Court of Environment with real but limited powers.... Environment should not be "isolated" but should be seen in broader context. The UN Trusteeship Council could be transformed to the Sustainable Development Council.... No need to create new institutions if UNEP would do its work and push the World Court in the Hague to address such cases.... Probably yes, the problem is that the international institutions, when established, live their own life.... Would be nice but national states are not willing to take responsibility and to be controlled by international organizations.

1.23 NGOs and governments should increase national and international efforts to build communities that provide models of sustainable economic development.

China has 60 such experimental models in operation today.... Include governance in these models as a key element.....develop these communities in different settings around the

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world designed around reduced consumerism, sustainability, community values, traffic-free, sylvan spaces, with fewer than 2,000 people initiated by private land developers with support from, and in consultation with, local government, state government, community development NGOs, other relevant environmental, urban farming, appropriate energy NGOs....The environmentalist must meet the economist half-way to create these....Get all the stakeholders involved to build consensus. Invite broad participation in their design - especially by those who will live there....Use these communities to create lists of information about what works.

Provide natural habitat corridors and integration of habitat in agriculture to protect biodiversity initiated by local government regulations, and support programs, farmers and agribusiness, in consultation with environmental NGOs....Make the connection between sustainability and new holistic models of the society....OK, but a lower priority....There is deep need to have private property, private ownership in our mind.

1.24 Set goals or limits for percent of land-use for natural pristine reserves, low intensity agriculture, and high intensity agriculture.

Good idea, should be led by government ministries of agriculture and natural resources...We don't know enough to do this yet. Instead, give incentives for good behavior...Create the universal principles but customize locally, since the population to land area varies.

1.25 Pursue policies to minimize the need for travel, such as local production and telecommuting, initiated by local governments, planning authorities, industry associations, telecommunications companies, and community development NGOs.

It is an important point, but no agreement about leadership for this suggestion.

1.26 Consider sustainable development goals in all other national and international public policies and relations.

Very important and UNEP should coordinate with government environmental agencies.... It is necessary to try and try again.... Very important, but too general

1.27 With broad public support, encourage governments to enter into voluntary agreements with industry, under which industry is willing to commit itself to go

"beyond regulation" in exchange for a relaxation of administrative and compliance costs of regulations (data collecting, reporting, verification).

This is related the strategy of ISO 14001 discussed previously.... It is more accepted in developed countries; the developing ones are preparing for it....Today unrealistic, maybe counterproductive ....UNEP should encourage this

1.28 NGOs, with some leadership from individuals and groups, should increase awareness of the dangers associated with monopolies created by political and economic groups among the media and public.

Policies that foster equal opportunity should prevent this.... Implement policies that create synergies among growth, equity, and the environment.... Growth does not have to cut equity.... NGOs should work through political parties to influence government policy. Those policies should balance the macro with the micro.

Additional actions:

[These "additional actions" and those listed for the other challenges were suggested by policy-makers during the interviews and staff research to update these suggestions.]

Establish an Environmental Security Council as a parallel organization to the UN Security Council ....Establish a unified organization for coordinating the relations among UN organizations and countries that is multi-disciplinary and multi-sectoral. Such coordination has worked locally very well in Shan-jing-hu region, Jiangxi Province....The UN or World Bank should establish a foundation to support the implementation of the strategies for sustainable development in developing countries.... We need an international assessment, raising, and distribution of financial resources... Add or set up new World Environment Organization and make WTO use full cost pricing and HDI indicators instead of GDP....

Developed countries should provide financial aid for nature conservation in poorer regions.... The IMF should use the Asian financial crisis and forest fires to: 1) give greater weight to sustainable development in their loan criteria; 2) insist on international accounting standards for foreign direct investment; and 3) explore the feasibility of leveraging fees on currency speculation.

The United States should provide leadership in the global consideration of the many trade-offs in the use of "environmental space" and development...It may require guerilla tactics from environmental NGOs to get effective action to achieve this opportunity....Instead of showing only media images of "structured permanent employment" show "unstructured part-time employment" as an alternative to unemployment.... Define some alternative macroeconomic indicators to GNP....

Establish face-to-face networking and Internet banks to lend to ethical/sustainable projects as competition with existing banks....For better understanding, it should be created a one word international term for sustainable development. In some languages it is difficult to express it.... Sustainable development will be enhanced if relief and development were more integrated. Usually, UNHCR is the first organization to enter a post-conflict situation. There is little connection between relief programs and the development programs that follow. This could be changed if the World Bank, UNDP and others created a joint approach with UNHCR during assessments and missions.

We need environmental law to be transnational law, not international law, to accommodate so many different legal systems....Although naive visions of the end of the nation-state in the era of globalization are misleading, yet due to the changing role of the state, the actions should be more oriented towards creating consciousness of that kind at inter (supra)national level.

----further notes to integrate:
Half the species on our planet could be extent with the next hundred years.

Agreement Reached On Env'tal Reporting Guidelines

A coalition of corporations and nongovernmental groups from around the world has reached agreement on a set of international guidelines for corporate environmental reports.
The Corporate Sustainability Reporting Guidelines were developed over the past year by the Boston-based Coalition for Environmentally Responsible Economies (CERES), the World Business Council for Sustainable
Development, the Washington-based World Resources Institute, the UN Environment Program and other groups and companies. More than 350 participants from 16 countries attended a conference in London two weeks ago that put some finishing touches on the guidelines (UNEP release, 15 Mar).
According to Judy Kuszewski of CERES, General Motors, ITT Industries and the Interface flooring company have already made a commitment to the guidelines, while more than 20 companies are actively considering them (UN Wire sources). Under the guidelines, corporations will publish annual reports with information on such topics as their use of energy and materials and their pollutant emissions (Europe Information Service, 16 Mar).
The guidelines are designed to be flexible enough to appeal to industry, yet rigorous enough to satisfy environmental groups and other watchdogs. They also are compatible with existing international environmental management systems such as the ISO 14000 program and the European Union's eco-management and audit scheme (EMAS). But the new guidelines go further than those systems by emphasizing annual reports and a continuous dialogue process with stakeholders.

The UNEP contributed to this effort as early as 1993, when it published a list of "50 key ingredients" for environmental reports. Since then, the agency also has worked with the UK-based management consultancy SustainAbility to produce seven major reports on the issue (UNEP release).

Sixteen multinational companies have so far joined discussions aimed at establishing a Global Sustainable Development Facility (GSDF). Each of the 16 has contributed $50,000 to support the design phase, and UNDP officials insist there has been no quid pro quo.

6.1.2. How can water conflicts be prevented while making water available to everyone?

The World Meteorological Organization estimates that 1 billion people could be living in countries with moderate to severe water *shortages* by the year 2025, and this could double by 2050. Currently UNICEF estimates that 1.1 billion lack *safe* water, where 2.9 billion people have no access to adequate sanitation facilities, and 80% of all diseases in the developing world are water-rated diseases from which 4 million children died in 1998.

The World Water Commission has written a troubling scenario: despite reasonably optimistic assumptions about improved desalination, agricultural efficiencies, use remote sensing satellites for new sources of water, and other investments into improved water shed management, most of the problems we face today will not be solved by 2025.

More than twenty countries depend on their neighbors for much of their water supply; over 200 river basins are shared by at least two countries; and more than 40% of the world population lives in river basins shared by more than two countries. Until water management gets higher on the global agenda, water conflicts between Turkey and Syria, Jordan and Israel, and/or Egypt and Sudan seem inevitable. Internal social instability also is likely in countries like China, which has over 300 major cities which face water shortages today. Eleven African and nine Middle Eastern nations are currently facing scarcity. Mexico, parts of northern China (including Beijing and the surrounding agricultural lands), parts of India (including New Delhi and thousands of rural villages), and portions of the western US also lack sufficient clean water supplies.

Availability of water is seriously affected in most parts of the world by problems such as inadequate waste management, excessive consumption, contamination of water aquifers, lack of proper water-gathering and distributing technology, and excessive farming on marginal lands. These problems will only continue to grow worse since water consumption is doubling every 20 years, while as much as 50 percent of the water supply in some major Third World cities leaks away. Water withdrawals in 1950 were 1,365 cubic kilometers. Trends in population, urbanization, tourism, and standard of living are

expected to increase this to 5,187 cubic kilometers by the year 2025, according to Dr. Shiklomanov, St. Petersburg Institute of Hydrology. At the same time, water tables and renewable water resources are falling.

Climate change is also a factor. Global warming changes rainfall patterns undermining the effectiveness of existing water control, storage, and distribution facilities, and will change areas affected by scarcity and floods possibly leading to mass migrations in heavily populated areas as in Bangladesh, India, and China. These migrations can be further complicated by massive outbreaks of disease.

As urbanization, population, and economic growth continue, competition between urban and agricultural uses of water will grow, and this competition can become a source of political instability and conflict. Water sources may become more tempting as targets for terrorists - such as was done in Kosovo and Sierra Leone in 1998.

To further complicate the situation, agricultural uses far exceed other uses of water, accounting for as high as 70% of total water usage in some regions. With the demand for food increasing, pressure to use water for agriculture will certainly increase as well. In some regions, previously fertile agricultural land is becoming brackish and useless due to long-term geological trends. Research is underway to develop plant strains that can be irrigated in salt and brackish water and that require less water. There has been limited success, but even if such developments were immediately available and effective for important crops, many years would pass before these technologies could diffuse throughout the world's agriculture.

The problems brought on by lack of water reduce the amount of time available for learning and work, and also negatively affect water-dependent industrial production. People in rural Africa, mainly women and children, spend as many as 40 billion hours each year hauling water.

The cost of developing new water sources will be twice that of current sources. While methods do exist to purify salt water, these methods are still expensive and often impractical. President Jacques Chirac estimated it will cost $400 billion to solve the water problems. The World Bank estimates that states have pledged $60 billion to $80 billion over the next 10 years for this problem.

Actions to Address Challenge 2, with a Range of Views on These Actions

2.1. Governments should use water prices as a policy tool to improve the efficiency of water usage.

This will require reliable network wide water metering systems....Include legislative and statutory prices, incentives, and public awareness campaigns....This will help get the

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public to support fixing leaking water pipes (in Cairo 50% of the water in Cairo's water is lost between source and customer - some may be stolen, but much is lost due to leakage)....Gradually end subsidized water, especially for agriculture..... Both governments and business should implement strict water recycling policies for industry... Increasing price could increase supply by the private sector....Privatization does not necessarily imply ownership; water sources can be leased by the private sector...But how are you going to persuade countries who had been using water for free since the antiquity... The UNDP, World Bank, UN Children's Fund (UNICEF), and other international organizations are implementing water and sanitation programs and need more financial support.... Support efforts such as the World Water Commission's work in organizing international meetings on water, establishing an information network of experts, and promoting visions and programs by regions, and the UN University's International Network on Water, Environment, and Health (UNU/INWEH).

2.2. Improve efficiency of agricultural usage of water.

Governments should organize scientists or work cooperatively to improve drip and spray irrigation rather than channel irrigation, as well as create new water resources, timing and quota systems.... Water for irrigation should be transported to the plot, not run through the entire field....Irrigation canals should be lined and flushed properly....Agriculture should combine drip irrigation with the use of plastic film (closed environment agriculture), where possible, to reduce evaporation and increase water efficiency, which also reduces the flow of fertilizers, pesticides, herbicides, fungicides....Use vertical PVC pipes filled with soil with holes in the cylinders for high price items like strawberries with drip irrigation within closed plastic environments....Irrigation efficiencies will be necessary to make up the losses in river flows (e.g., Sudan will take more water from the Nile as it develops, requiring Egypt to use the Nile more efficiently for agriculture) to prevent transboundary water disputes... Improve management of water basins.....Invest in reforestation.

2.3. Corporations with support from government should accelerate their research and development to reduce the cost of desalination and other technologies that can increase supply and improve efficiency of water use.

This is necessary and unavoidable in some countries.... Start with brackish water, which has less salt than sea water. It can be used especially for irrigation. Unfortunately, the cost/benefit ratio of salt water conversion to drinking water is not attractive yet.... Also consider the economics of water transportation.... Add "artificial precipitation" or "rain making." The meteorological departments in China have successfully performed this, resulting in significant social and economic benefits. More attention should be paid to meteorological engineering.... Users' associations and water distribution companies should also provide leadership....Invest into new bio-tech membrane filters to purify large amounts of urban water...India has demonstrated that evaporation open air reservoirs can be reduced by 30% using chemicals on the surface of the water.

2.4. The private sector, with some support from governments, should encourage further development of plant strains and agricultural practices that use salt or brackish water for irrigation and/or that are drought-hearty.

Brackish water represents 50% of some countries' water resources.... Acreage dedicated to transgenic crops jumped from 7 million in 1996 to 75 million in 1998...UNDP, UNEP, IFAD, and others are currently negotiating responsibilities for implementing development plans arising from UNCED, especially the dry lands and desertification sections.

2.5. Governments, with some leadership from the private sector, should develop water trading and marketing practices that allow users and managers to better allocate scarce supplies and fund conservation.

This will require reliable measurements and advanced monitoring techniques.... Water pipelines would benefit both supplier and consumer regions.... South African Development and Cooperation (SADAC) countries will be the first to work with UNDP and others on the legal transborder solutions to these issues.... It is a very complex issue with many political, social, and human implications. Like air and ozone, it poses complex problems of sovereignty, in addition to economic, legal, political, ethical, and even philosophical problems....Many argue that water is not the property of anybody, though its access can be leased....such trading offers an important method to manage gaps and surpluses of water demand and supply.

2.6. Governments, with some leadership from international organizations, should secure treaties and cooperative agreements on water rights among nations that share water resources before shortages occur.

This should be implemented among countries, not as a world order.... SADAC will be the region to participate in the new UNDP "Water Sharing" program to assess transborder water issues and potentials for agreements. If successful, this will be replicated to other areas with transborder water problems.... Regional regimes should be established like the one in the Mekong River. Most importantly, countries should share all data. It is extremely difficult to get valid, scientific objective data. Especially if the regimes are authoritarian....Special attention has to be given to the use of fossil water that exists under two or more countries, when one country uses it to the degree that it denies neighboring countries' future use. For example, Israel's depletion of fossil water, at the expense of its Arab neighbors, is a particularly difficult case.... The Turkish Prime Minister Demirel suggested an exchanging water from Turkey, Oil from Iraq, and Natural Gas from Syria. Owing to political realities, agreements also need to be made among different areas or regions within the same country.

2.7. UN organizations should establish a world water agency to develop and expedite new water technology and water extraction and collection projects.

The World Water Council based and the Global Water Partners in Stockholm already exist and sometimes they have problems coordinating initiatives, but they are able to

conduct this mission. There is no need for another agency.... the World Water Commission and the Water Vision Project of UNESCO could add this to their global dialog on water.... Maybe after the current UN reform and re-organization is complete, this action could be implemented.... The Economic and Social Council (ECOSOC) of the UN can help, but its structure needs to be changed.... This is the most important action and would make other actions more successful.... The establishment of this agency should be put forward at the General Assembly of UN conferences related to this issue. It should include coordination with national legislative bases, research and development, expediting use of new technologies, and popularizing this problem in the media.

ADDITIONAL ACTIONS TO ADDRESS CHALLENGE 2

Promote vegetarianism as it takes 2,640 gallons of water to produce 1 pound of beef in the United States... Some locations would benefit from parallel water systems (drinkable and non-drinkable). Why waste clean water to flush toilets, run hydroelectric plants in Brazil, and water lawns, golf courses, and house plants?

We have to change our minds about using water to transport wastes out of houses and buildings. Dry composing toilets have been proven as an alternative to water sanitation systems, will improve soil fertility, and can become a new income source rather than a water cost. People in areas with income per capita at or below US$500 cannot afford waste treatment.

Learn from the success of the Tennessee Valley Authority on water supply...... Use sea ice in temperate zones, such as was done successfully in The Netherlands.... We need to go back to the recommendations of the water meeting in Dublin....Improve security against terrorist attacks on water systems.... Support UNEP's Global International Water Assessment Project for early warning, monitoring, and assessment systems.

Contributions to State of the Future 1999 Publication

7. 1. Textual Contributions

1. Updated seven sections of the Issues and Opportunities Chapter;
2. Edited entire working draft;
3. Updated Appendix A: Participants List;
4. Contributed to the addition of scenarios in the Annotated Bibliography Appendix

7. 2. Additional Appendix: Environmental Security

Currently I am working with Tammy Onaka, from Japan, on an additional Appendix which will deal with Environmental Security. We both are reading international and multilateral treaties, charters, agreements, and conventions in order to list the jurisdiction of each country, member nation, organization, international body, etc. The following chart shows my progress to date. This is an on-going study and will take several years.

However, I have made arrangements with Mr. Glenn and Ms. Onaka to help Ms. Onaka with any other help that she may need in the future concerning the creation of such a chart. Ultimately, we would like to create a chart which shows where, in the case of an environmental disaster or security breach, the national jurisdiction leaves off and the international jurisdiction takes over, also looking at liability and nation-state responsibility on a global scale.

Multilateral Treaty	Jurisdiction

Convention of Biological Diversity (1992)	* **states have sovereign rights over their own biological resources (preamble)**
	* fundamental requirement for the conservation of … is the in-situ conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species…
	* Article 4: Jurisdictional Scope.. subject to the rights of other States..
	    * …in areas within the limits of its national jurisdiction;
	    * in the case of processes and activities, regardless of where their effects occur, **carried out under its jurisdictional or control within the area of its national jurisdiction or beyond the limits of national jurisdiction**

Convention on Fishing and Conservation of the Living Resources of the High Seas (1958)	* Preamble
	    * …has exposed some of these resources to the danger of being exploited,
	* Article 1
	    * **all states have the right for their nationals to engage in fishing on the high seas, subject a) to their treaty obligations, b) to the interests and rights of coastal States as provided for in this Convention, and c) to the provisions contained in the following articles…**
	* Article 2
	    * conservation programs should be formulated…to **securing…first place a supply of food for human consumption.**
	* Article 3
	    * for its own nationals, measures in that area when necessary for the purpose of the conservation of the living resources affected…
	* Article 4
	    * If the **nationals of the two or more States** are engaged in fishing…**enter into negotiations** with a view to prescribing by agreement for their nationals…
	* Article 5
	    * if, subsequent to the adoption of the measures referred to in articles 3 and 4,…the other states shall apply measures, which shall not be discriminatory…**to their own nationals no later than seven months after the date** on which the measures shall have been notified to the Director-General of the Food and Agricultural Organization of the United Nations.
	* Article 6
	    * **2. A coastal state is entitled to take part on an equal footing in any system of research and regulation…even though its nationals do not carry on fishing there.**
	    * **3. A State whose nationals are engaged in fishing…adjacent to the territorial sea of a State shall, at the request of that**

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	coastal State, **enter into negotiations** with a view to prescribing by agreement the measures necessary for the conservation…
	* Article 8
	* 1. Any state which, **even if its nationals are not** engaged in fishing in an area of the high seas not adjacent to its coast, has a special interest in the conservation…may request the State or States whose nationals are engaged **in fishing there to take the necessary measures of conservation** under Article 3 and 4…
	* Article 9
	* 1. **Any dispute** which may arise between States under article 4, 5, 6, 7, and 8 shall, at the request of parties, **be submitted for settlement to a special commission of five members**, unless the parties agrees to seek a solution by another method of peaceful settlement, as provided for in Article 33 (UN charter)
	* 3. **Any state party to proceeding…shall have the right to name one of its nationals to the special commission,** with the right to participate fully…,**but without the right to vote or take part in writing of the commission's decision.**
	* 7. Decisions of the commission shall **be by majority vote.**
	* Article 11
	* The decisions of the special commission shall be **binding on** the States concerned and the provisions of **paragraph 2 of Article 94 of the Charter of the United Nations** shall be applicable to those decisions.
	* Article 12
	* If the factual basis of the award of the special commission is altered by substantial change…any of the States concerned may request the other States to enter into negotiations…
	* Article 13
	* the regulation of fisheries conducted by means of equipment embedded in the floor of the sea…may be undertaken by that State where such fisheries have long been maintained and conducted by its nationals, provided that non-nationals are permitted to participate…on an equal footing…except in areas where such fisheries have by long usage been exclusively enjoyed by such nationals. Such regulations will not, however, affect the general status of the areas as high seas.
	* Article 14
	* …term "nationals" means fishing boats or craft of any size having the nationality of the State concerned,
Convention on International Trade in Endangered Species of Wild Fauna and Flora (1979)	* Preamble
	* …wild fauna and flora…are irreplaceable part of the natural systems…which must be protected for this and generations to come;
	* international cooperation is essential for the protection
	* Article 1 (definitions)
	* "species" means any species, subspecies, or geographically separate populations of;
	* "specimen" means
	* 1) any animal or plant, whether alive or dead;
	* 2) in the case of animals…any readily recognizable

	part of derivative thereof; and for species...any recognizable part of derivative
	* Article II (fundamental principles)
	* 1. Include all species threatened with extinction which are or may be affected by trade. Trade in specimens...must be subject to...strict regulation ...must only be authorized in exceptional circumstances.
	* Article III (Regualtions of Trade in Specimens of Species Included in Appendix I)
	* 2. The export of any specimen of a species included in Appendix I shall require the prior grant and presentation of an export permit. Conditions for export permit:
	* a Scientifif Authority of the State of export has advised that such export will not be detrimental to the survival
	* a Managment Authority of the State of export (MASE) satisfied that the specimen was not obtained in contravention fo the Law of that State
	* a MASE is satisfied that any living specimen will be so prepared and shipped as to minimize the risk of injury, damage to health or cruel treatment
Law of the Sea Convention	* from the Basic facts about the United Nations (p. 266)
	* coastal states **exercise sovereignty over their territorial sea up to 12 nautical miles,** while all States enjoy the freedom of navigation through the territorial sea of coastal State;
	* ships and aircraft of all countries are **allowed "transit passage" through straits used for international navigation; States alongside the straits can regulate navigation and other aspects of passage;**
	* **coastal state have a sovereign rights in a 200-nautical mile 'exclusive of economic zone" (EEZ) on natural resources and certain economic activities,** and also exercise jurisdiction over marine science research and environmental protection; all other States have freedom of navigation and overflight in the zone, as well as freedom to lay submarine cables and pipelines;
	* **'archipelagic states" - ...have sovereignty over a sea area enclosed by straight lines drawn between the outermost points of the islands;**
	* **coastal states have jurisdiction over the resources of their continental shelf** (the under-sea extension of a State's land territory); **a Commission on the Limits of the Continental Shelf is to make recommendations to coastal State that claim that their continental shelf extends beyond 200 miles;**
	* all states are obliged to adopt measures to manage an conserve living resources; **States are bound to prevent and control marine pollution and are liable for damage caused by violation..**
	* states are obliged to **settle by peaceful means their disputes** concerning the interpretation or application of the Convention; **disputes can be submitted to the International Tribunal for the Law of the Sea..., to the ICJ, to arbitration or to conciliation. The Tribunal has exclusive jurisdiction over deep seabed mining disputes**
Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (1963)	* put an end to the armaments race and eliminate the incentive to the production and testing of all kinds of weapons, including nuclear weapons (preamble)
	* Article I:

	* undertake to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control; * a) in the atmosphere; beyond its limits, including outer space; or underwater, including territorial waters or high seas; * b)....without prejudice to the conclusion of a treaty resulting in the permanent banning of all nuclear test explosions, including all such explosions underground... * c)...to refrain from causing, encouraging, or in any way participating in, the carrying out of any nuclear weapon test explosion, anywhere.... * Article IV * each party shall...have the right to withdraw from the Treaty...
International Tropical Timber Agreement (1983)	* Chapter 1 Article 1 (a) To provide an effective framework for cooperation and consultation between tropical timber producing and consuming members with regard to all relevant aspects of the tropical timber economy: * Article 5: "having responsibilities in respect of the negotiation, conclusion and application of international agreements, in particular commodity agreements." * Article 14, 1. "The Council shall make whatever arrangements are appropriate for consultation or co-operation with the United Nations and its organs, such as the United Nations Conference on Trade and Development (UNCTAD)," (UNIDO), (UNEP), (UNDP), (FAO), and UNCTAD/GATT (ITC). * Chapter VII Article 23: The Council shall examine all project proposals in the fields of research and development....[these] Research and development projects should relate to at least one of the following five areas: (a) **Wood utilization** (b) **Natural forest development** (c) **Reforestation development** (d) **Harvesting** (e) **Institutional framework, national planning** *Article 24: Establishment of (b) Committee on Reforestation and Forest Management; Article 25: Function of the Committee: 2. "The Committee on Reforestation and Forest Management shall: (a) **Keep under regular review the support and assistance being provided at a national and international level for reforestation management for the production of industrial;** (b) **Encourage the increase of technical assistance to national programmes for reforestation and forest management;** (c) **Assess the requirements and identify all possible sources of financing for reforestation and forest management;** (d) **Review regular future needs of international trade...;** (e) **Facilitate transfer of knowledge...;** **Co-ordinate and harmonize these activities for co-operation in the field of reforestation and forest management with the relevant activities pursued elsewhere, such as those under FAO, UNEP, the World Bank, regional banks and other competent organizations.**
Convention on the Prohibition of Military or Any Other Hostile Use of	* Article 1: "Each State Party to this Convention undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe

Environmental Modification Techniques	effects as the means of destruction, damage or injury to any other State Party; * Article II: As used in article 1, the term "environmental modification techniques" refers to any technique for changing-through the deliberate manipulation of natural processes-the dynamics, composition or structure of the Earth including its biota, lithosphere, hydrosphere and atmosphere, or of outer space. * Article III, 2: The States Parties to this Convention...**undertakes to facilitate the exchange of scientific and technological information...State Parties in a position to do so shall contribute, alone or together with other States or international organizations, to international economic and scientific co-operation in preservation, improvement and peaceful utilization of the environment, with due consideration for the needs of the developing areas of the world.** * Article IV: ...undertakes to take any measures it considers necessary in accordance with its constitutional process to prohibit and prevent any activity in violation of the provisions of the Convention anywhere under its jurisdiction or control * Article V, 3: **"Any State Party to this Convention which has reason to believe that another State Party is acting in breach of obligations derived from the provisions of the Convention may lodge a complaint with the Security Council of the United Nations. Such a complaint should include all relevant information as well as all possible evidence supporting its validity.** * Article V, 4-5: Each State Party...undertakes to cooperate in carrying out any investigation which the Security Council may initiate, in accordance with the provisions of the Charter of the U.N., on the basis of the complaint received by the Council.
Convention on Early Notification of a Nuclear Accident	* Article 1: Scope of Application 1: ...[applies] in the event of any accident involving facilities or activities of a State Party or of persons or legal entities under its jurisdiction or control: 2. (a) **any nuclear reactor wherever located;** (b) **any nuclear fuel cycle facility;** (c) **any radioactive made management facility;** (d) **the transport and storage of nuclear fuels or radioactive wastes;** (e) **the manufacture, use, storage, disposal and transport of radioisotopes for agricultural, industrial, medical and related scientific and research purposes; and** (f) **the use of radioisotopes for power generation in space objects** • **In the event of an accident the State Party shall forthwith notify, directly or through the International Atomic Energy Agency, those States which are or may be physically affected as specified in article 1 and the Agency of the nuclear accident, its nature, the time of its occurrence and its exact location where appropriate; and to promptly provide the States referred to in sub-paragraph (a) directly or through the IAEA, with such available information relevant to minimizing the radiological consequences in those States** • The IAEA shall inform State Parties, Member States, other States which are or may be physically affected...and relevant international organizations of a notification...and promptly provide any State Party, Member State or relevant international organization, upon request, with

	the information received
	• Article 5: Information to be provided:
	1. the time, exact location where appropriate, and the nature of the nuclear accident;
	2. the facility or activity involved;
	3. the assumed or established cause and the foreseeable development of the nuclear accident relevant to the transboundary release of the radioactive materials;
	4. the general characteristics of the radioactive release, including...the nature, probably physical and chemical form and the quantity, composition and effective height of the radioactive release;
	5. information on current and forecast meteorological and hydrological conditions, necessary for forecasting the transboundary release of the radioactive materials;
	6. the results of environmental monitoring relevant to the transboundary release of the radioactive materials;
	7. the off-site protective measures taken or planned;
	8. the predicted behaviour over time of the radioactive release.
	* Article 8: Assistance to State Parties: "the agency shall...upon request of a State Party which does not have nuclear activities itself and borders on a State having an active nuclear programme but not Party, conduct investigations into the feasibility and establishment of an appropriate radiation monitoring system..."
	* Article 11: Settlement of disputes: "if a dispute...cannot be settled within one year from the request...it shall...be submitted to arbitration or referred to the International Court of Justice for decision. Where a dispute is submitted to arbitration, if, within six months from the date of the request, the parties ...are unable to agree on the organization of the arbitration, a party may request the President of the International Court of Justice or the Secretary-General of the U.N. to appoint one or more arbitrators." The request of the Secretary General shall have priority.
Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency(1986)	* Article 1, 1: "The States Parties shall cooperate between themselves and with the IAEA...to facilitate prompt assistance in the event of a nuclear accident or radiological emergency to minimize its consequences and to protect life, property and the environment from the effects of radioactive releases."
	* Article 2, 1: " If a State Party needs assistance...whether or not such accident or emergency originates within its territory, jurisdiction or contro, it may call for such assistance from any other State Party, directly or through the IAEA, and from the IAEA or...international intergovernmental organizations."
	* Article 2, 2: "In the event that it is not practicable for the requesting State Party to specify the scope and the type of assistance required, the requesting [and assisting] State Parties shall, in consultation, decide [these things]."
	* Article 2, 5: "Any State Party may request assistance relating to medical treatment or temporary relocation into the territory of another State Party of people involved in a nuclear accident or radiological emergency."
	* Article 2, 6: The IAEA "shall respond...by (a) making available appropriate resources allocated for this purpose; (b) transmitting promptly the request to other States and international organizations...; (c) if so requested...co-ordinating the assistance at the international level.

	* Article 3: "Unless otherwise agreed: (a) the overall direction, control, co-ordination and supervision of the assistance shall be the responsibility within its territory of the requesting State. The assisting party should, where the assistance involves personnel, designate in consultation with the requesting State, the person who should be in charge of and retain immediate operational supervision over the personnel and the equipment provided by it. The designated person should exercise such supervision in cooperation with the appropriate authorities of the requesting State; (b) the requesting State shall provide...local facilities and services for the proper and effective administration of the assistance. It shall also ensure the protection of personnel, equipment and materials brought into its territory by or on behalf of the assisting party for such purpose. * Article 5: Functions of the IAEA: " to: (a) collect and disseminate to States Parties and Member States information concerning: (I) experts, equipment and materials...available...(ii) methodologies, techniques and available results of research relating to response...(b) assist a State Party...when requested in any of the following or other appropriate matters: (I) preparing emergency plans and...appropriate legislation; (ii) develop training programmes for personnel; (iii) transmit requests for assistance and relevant information; (iv) develop radiation monitoring programmes, procedures and standards; (v) conduct investigations into the feasibility of establishing radiation monitoring systems; * Article 5, (e): "Establish and maintain liaison with relevant international organizations...to obtain and exchange...information and data, and make a list of such organizations available to States Parties..."
Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (1993)	* Preamble: "..emissions released in one country may cause damage in another country and that...the problems of adequate compensation...are also of an international nature"; * Preamble: "Having noted Principle 13 of the 1992 Rio Declaration on Environment and Development, according to which "States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage; they shall also co-operate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction." * Article 2: Definitions: 10: "Environment includes: natural resources both abiotic and biotic, such as air, water, soil, fauna and flora and the interaction between the same factors; property which forms part of the cultural heritage; and the characteristic aspect of the landscape." * Article 6 and 7 (all) deals with Liability: : example: "If an incident consists of a continuous occurrence, all operators successively exercising the control of the dangerous activity during the occurrence shall be jointly and severally liable." * Article 8: Exemptions: "(a) was caused by an act of war, hostilities, civil war, insurrection or a natural phenomenon of an exception, inevitable and irresistible character." * Article 14: 1: "Any person shall, at his request and without his having to prove an interest, have access to information relating to the environment held by public authorities."

	* Article 15: "On the same terms…as those set out in Article 14 any person shall have access to information relating to the environment held by bodies with public responsibilities for the environment and under the control of a public authority. Access shall be given via the competent public administration or directly by the bodies themselves." * Article 18-Requests by Organizations: 1. "Any association or foundation which according to its statures aims at the protection of the environment and which complies with any further conditions of international law of the Party where the request is submitted may request: a) the prohibition of a dangerous activity which is unlawful and poses a grave threat to the environment; b) that the operator be ordered to take measures to prevent an incident or damage; c) that the operator be ordered to take measures…to prevent damage;" * Article 23-Recognition and Enforcement: 1. "Any decision given by a court with jurisdiction in accordance with Article 19 above where it is no longer subject to ordinary forms of review, shall be recognized in any Party…2. A decision which is enforceable in the Party of origin shall be enforceable in each Party as soon as the formalities required by that Party have been completed. * Chapter VI-Standing Committee, Article 26-The Standing Committee: 1. "For the purposes of this Convention, a Standing Committee is hereby set up…7. The Standing Committee shall be convened by the Secretary General of the Council of Europe. It shall meet whenever one-third of the Parties or the Committee of Ministers of the Council of Europe so request." Article 27-Functions of the Standing Committee: "The Standing Committee shall keep under review problems relating to this Convention…a) consider any question of a general nature referred to it concerning interpretation or implementation of the Convention. The Standing Committee's conclusions concerning implementation of the Convention may take the form of a recommendation:" * Article 34-Territories: 1. "Any Signatory may…specify the territory or territories to which this Convention shall apply."
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal(1989)	* Preamble: "Fully recognizing that any State has the sovereign right to ban the entry or disposal of foreign hazardous wastes and other wastes in its territory…Noting that a number of international and regional agreements have addressed the issue of protection and preservation of the environment with regard to the transit of dangerous goods…Affirming that States are responsible for the fulfillment of their international obligations concerning the protection and preservation of the environment, and are liable in accordance with international law…are Determined to protect, by strict control, human health and the environment against the adverse effects which may result from the generation and management of hazardous wastes and other wastes." * Article 2, Number 8: " 'Environmentally sound management of hazardous wastes and other wastes' means taking all practical steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes." * Article 4: General Obligations 1 a-c, 2 a-h; * Article 5, Number 1: "Designate or establish one or more competent authorities and one focal point. One competent authority shall be designated to receive the notification in case of a

	State of transit. 2. Inform the Secretariat [of these agencies] and 3. Inform the Secretariat...of changes regarding [this] designation."
	* Article 10-International Co-operation: 1. "The Parties sahll co-operate with each other in order to improve and achieve environmentally sound management of hazardous wastes and other wastes."
	Article 10, Number 2, b) Cooperate in monitoring the effects of the management of hazardous wastes on human health and the environment."
International Convention on Oil Pollution Preparedness, Response and Co-operation, (1990)	*
International Convention for the Regulation of Whaling(1946)	* Preamble: "Recognizing the interest of the nations of the world in safeguarding for future generations the great natural resources represented by the whale stocks;"
	* "Desiring to establish a system of international regulation for the whale fisheries to ensure proper and effective conservation and development of whale stocks on the basis of the principles embodied in the provisions of the International Agreement for the Regulation of Whaling signed in London on 8 June 1937, and the protocols to that Agreement signed in London on June 1938, and 26 November 1945;"
	* Article IV: 1: "The Commission may in collaboration with or through independent agencies of the Contracting Governments or other public or private agencies, establishments, or organizations, or independently a) encourage, recommend...organize studies and investigations relating to whales and whaling; b) collect and analyze statistical information concerning the current conditions and trend of the whale stocks and the effects of whaling activities thereon; c) study, appraise, and disseminate information concerning methods of maintaining and increasing the populations of whale stocks."
	• Article V, 1.: "The Commission may...[adopt] regulations with respect to the conservation and utilization of whale resources, fixing (a) protected and unprotected species; (b) open and closed seasons; (c) open and closed waters, including the designation of sanctuary areas; (d) size limits for each species; (e) time, methods, and intensity of whaling (including the maximum catch of whales to be taken in any one season); ...(h) catch returns and other statistical and biological records."
	• Article IX, 1: "Each Contracting Government shall take appropriate measures to ensure the application of the provisions of this Convention and the punishment of infractions against the said provisions in operations carried out by persons or by vessels under its jurisdiction."
	• Article IX, 3: "Prosecution for infractions against or contraventions of this Convention shall be instituted by the Government having jurisdiction over the offender."
	• Article X, 3: "The Government of the United States of America shall inform all other signatory Governments and all adhering Governments of all ratifications deposited and adherences received."

	• Protocol of Amendment: "…the 1946 Whaling Convention…extend the application of that Convention to helicopters and other aircraft and to include provisions on methods of inspection…"
Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies(1967)	* Article 1: "The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, **and shall be the province of all mankind.**" * Article 1: "Outer space…shall be free for exploration and use by all States without discrimination…in accordance with international law, **and there shall be free access to all areas of celestial bodies.**" * **Article V: "States Parties to the Treaty shall immediately inform the other States Parties to the Secretary-General of the United Nations of any phenomena they discover in outer space, including the moon and other celestial bodies, which could constitute a danger to the life or health of astronauts."** * **Article VI: Responsibility designated as follows: "State Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities…The activities of non-governmental entities in outer space…shall require authorization and continuing supervision by the appropriate State Party to the Treaty…by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the State Parties to the Treaty participating in such organization."** * **Article IX: "State Parties to the Treaty shall pursue studies of outer space,…and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose."** * Article XI: "…State Parties…agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community to the greatest extent feasible and practicable, of the nature, conduct, and locations and results of such activities. On receiving…[this] information, the Secretary-General of the U.N. should be prepared to disseminate it immediately and effectively."
Convention on International Liability for Damage Caused by Space Objects(1972)	* **Article II: "A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight."** * **Article IX: "A claim for compensation for damage shall be presented to a launching State through diplomatic channels. If a State does not maintain diplomatic relations with the launching State concerned, it may request another State to present its claim to that launching State or otherwise represent its interest under this Convention. It may also present its claim through the Secretary-General of the United Nations, provided the claimant State and the launching State are both Members of the U.N."** * **Article XXI: "If the damage caused by a space object presents a large-scale danger to human life or seriously interferes with the living conditions of the population or the functioning of vital centres, the States Parties, and in particular the launching State,**

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	shall examine the possibility of rendering appropriate and rapid assistance to the State which has suffered the damage, when it so requests."
Convention on Wetlands of International Importance especially as Waterfowl Habitat	* Preamble: "Recognizing the interdependence of Man and his environment;...Desiring to stem the progressive encroachment on and loss of wetlands now and in the future;...Being Confident that the conservation of wetlands and their flora and fauna can be ensured by combining far-sighted national policies with co-ordinated international action;" * Article 2, Number 6: "Each Contracting Party shall consider its international responsibilities for the conservation, management and wise use of migratory stocks of waterfowl, both when designating entries for the List and when exercising its right to change entries in the List relating to wetlands within its territory." * Article 3, Number 2: "Each Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference. Information on such changes shall be passed...to the organization or government responsible for the continuing bureau duties specified in Article 8 (International Union for Conservation of Nature and Natural resources shall perform the continued bureau duties)." * Article 4: "Each Contracting Party shall...establish nature reserves on wetlands...and provide adequately for their wardening." * Article 9: "Any member of the United Nations or of one of the Specialized Agencies or of the International Atomic Energy Agency or Party to the Stature of the International Court of Justice may become a Party to this Convention."
World Charter for Nature(1982)	* Preamble: "Convinced that: (b) Man can alter nature and exhaust natural resources by his actions or consequences and, therefore, must fully recognize the urgency of maintaining the stability and quality of nature and of conserving natural resources," * Preamble: "Firmly convinced of the need for appropriate measures, at the national, and international, individual and collective, and private and public levels, to protect nature and promote international co-operation in this field," * I. General Principles: "2. The genetic viability on the earth shall not be compromised; the population levels of all life forms, wild and domesticated, must be at least sufficient for their survival, and to this end necessary habitat shall be safeguarded." * "3. All areas of the earth, both land and sea, shall be subject to these principles of conservation; special protection shall be given to unique areas..." * "5. Nature shall be secured against degradation caused by warfare or other hostile activities." * III. Implementation: "14. The principles...shall be reflected in the law and practices of each State, as well as at the international level." * "19. The status of natural processes, ecosystems and species shall be closely monitored to enable early detection of degradation or

	threat, ensure timely intervention and facilitate the evaluation of conservation policies and methods."
	* "20. Military activities damaging to nature shall be avoided."
	* "21. States and, to the extent they are able, other public authorities, international organizations, individuals, groups and corporations shall: C) Implement the applicable international legal provisions for conservation of nature and the protection of the environment; D) Ensure that activities within their jurisdictions or control do not cause damage to the natural systems located within other States or in the areas beyond the limits of national jurisdiction; E) Safeguard and conserve nature in areas beyond national jurisdiction."
	* "22. Taking fully into account the sovereignty of States over their natural resources, each State shall give effect to the provisions of the present Charter through its competent organs and in co-operation with other States."
Convention on Long-Range Transboundary Air Pollution(1979)	* Preamble: "Considering the...provisions of the Declaration of the U.N. Conference on the Human Environment, and in particular principle 21, which expresses the common conviction that States have...the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction,"
	* Article 2: "The Contracting Parties...are determined to protect man and his environment against air pollution and shall endeavor to limit,...gradually reduce and prevent air pollution including long-range transboundary pollution."
	* Article 6: "...each Contracting Party undertakes to develop...air quality management systems, and...control measures compatible with balanced development, in particular by using the best available technology which is economically feasible and low-and non-waste technology."
Rio Declaration on Environment and Development	* Principle 2: "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."
	* Principle 11: "States shall enact effective environmental legislation."
	* Principle 13: "States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage."
	* Principle 14: "States should...discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health."
	* Principle 15: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious

	or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measure s to prevent environmental degradation."
	* Principle 16: "National authorities should...promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should...bear the cost of pollution,"
	* Principle 17: "Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that...adverse[ly] impact ...the environment and are subject to a decision of a competent national authority."
	* Principle 18: "States shall immediately notify other States of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those States. Every effort shall be made by the international community to help States so afflicted."
	* Principle 19: "States shall provide...notification and...information to...States on activities that may have a...adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith."
	* Principle 20: "Women have a vital role in environmental management and development. Their participation is therefore essential to achieve sustainable development."
	* Principle 26: "States shall resolve their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations."

7. 3. Additional Contributions

In addition to the above work, I also contributed to the Planning Committee Presentation (held at the World Bank, Feb, 1999) by creating the following overhead. It will also be displayed in the 1999 State of the Future publication.
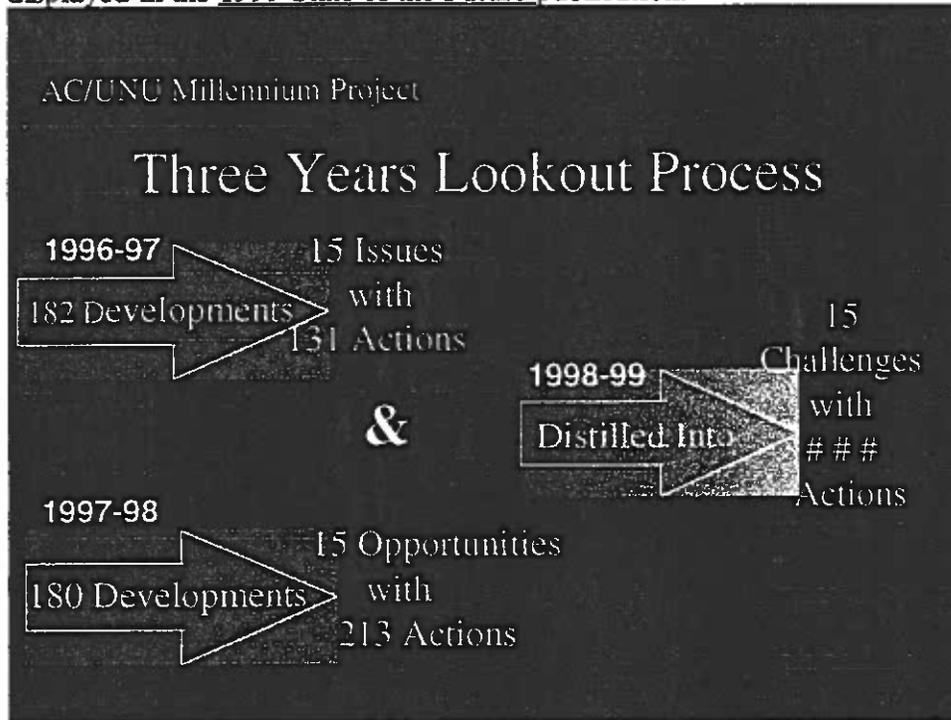
Conclusions and Significance

To conclude, upon my last day of work we had an informal meeting with Mr. Glenn, Ms. Florescue, and Ms. Onaka. I was asked to reflect back upon my internship experience and offer to them my fondest memory and share the knowledge that I had gained as an intern. Undoubtedly, my fondest memory was having dinner at the White House with five African presidents. Though I can see where I have contributed to the workings of the Millennium Project and the 1999 State of the Future publication, it is my belief that the Millennium Project has contributed to my own development. In comparison, I feel honored to have had the opportunity to work for such wonderful people and a worthwhile, significant project. The greatest thing that I learned while working on the Millennium Project was not about litigation concerning environmental security, nor was it the inside workings of Washington, D.C.. Rather, it was the acknowledgement of my intelligence and ability. As self-centered as that sounds, this internship has given me the intellectual self esteem that is necessary in today's fast-paced society.

The Millennium Project has been significant not only to my person, but on other levels, both national and international. For instance, the Millennium Project's work has impacted presentations at Japan's National Institute for Science and Technology, Spain's national government training institute, the Italian Public Television show entitled MediaMente, the American Society of Actuaries, the World Future Society conference,

State of the World Forum, the U.S. Naval Academy, and the International Symposium on Forecasting. Among its greater policy impacts, the Millennium Project has influenced the following: the AEPI, where the Millennium Project was a representative on the U.S. National Defense Panel; the World Council on Water in the 21st Century and UNESCO reprinted the water issue for global distribution; to the Singapore Judiciary, the Millennium Project was referred to extensively in the key note address given at the 3rd Asia Pacific Court Conference in Shanghai by the Chief Justice, Young Pung How.

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Application of the Balanced Scorecard to Concord College

By Michael O'Dell

Chuck Autrey, Mentor

December 18, 2002

A note of acknowledgement:

I would like to thank everyone who assisted with ideas and support throughout this research: The McNair staff at Concord, who have been invaluable assets and cheerleaders; other McNair scholars, including Bryan Grose and Tonya Payne, for their assistance and friendship; the division of Business and Economics, for their valuable insight and instruction; the staff, faculty, and administration of Concord, for their kindness and willingness to share with me their views and ideals of what a quality institution encompasses; and Sathappan Santhanam, a seemingly long lost brother from around the world.

Most of all I would like to thank my wife, Tammy, and our children for their love and numerous sacrifices they have been forced to make on my behalf; and Mr. Chuck Autrey, a mentor like no other – thank you for awakening in me a fire that I thought long ago extinguished.

I dedicate this work to the memory of my father, who died five years ago on this date.

Abstract

With organizations of all sizes and types constantly struggling to adapt to ever evolving environments, the Balanced Scorecard provides long-term management principles that fill the entity's need. This study addresses the application of the Balanced Scorecard to a not-for-profit, state funded institution of higher learning, Concord College. Interviews were conducted with those in leadership roles within the college; their responses led to the formation of five proposed objectives for the school.

Table of Contents

Concord College & The Balanced Scorecard

Founded in 1872, Concord College is a post secondary, public institution located in Athens, West Virginia. It currently offers courses for its approximately 2877 full and part time students. The liberal arts school offers a total of thirteen baccalaureate and associate degrees (Pitzer, 2001, p.7).

The Balanced Scorecard is a business tool developed by Robert S. Kaplan and David P. Norton. This "business" tool approaches management of an organization through a four faceted approach: financial; customer service; internal business; and learning and growth (Kaplan & Norton 1996, 2001). Although financial outcomes are vital to an organization, the analysis includes a broader framework of the organization's health, a holistic view.

Applications of the Balanced Scorecard have transitioned from the purely for profit business world to much more broad applications. Many not-for-profit entities are utilizing management tools that have been available in the business arena for some time. Cameron Preston cites the recent use of the Balanced Scorecard by the Alabama Department of Mental Health and Retardation (Cameron, 2001). The American Assembly of Collegiate Schools of Business (AACSB) also requires a process with almost identical characteristics to the Balanced Scorecard for its member programs (Bailey, 1999, p.84-85). As a not-for-profit public institution, Concord College is well suited to the framework and application of the principles of the Norton and Kaplan tool.

Some may question the application of a business management tool to an institution of higher learning, or even the application itself. Malina and Selto (2001) present perceived weaknesses of the application in *Communicating and controlling strategy: an empirical study of the effectiveness of the balanced scorecard*. Although valid points include ineffective, one way organizational communication as a weakness, the same work also indicates that when the scorecard is effectively formulated and implemented, it is effective. (Malina, 2001)

The Balanced Scorecard Implementation Plan

As suggested by Norton and Kaplan in The Balanced Scorecard, the appropriate organizational unit was identified at the college. (Kaplan & Norton, 1996, p.201) The

framework consisted of a two-tier administration and a single category layer of divisions, composed of various departments. They are listed in Appendix A.

Additional subunits could be easily identified and developed into further study. Other units could include classified / support staff, adjunct faculty, volunteer organizations, committee systems, and the college board of governors. Although each avenue would merit a worthy study, this Balanced Scorecard application was limited to the direct administrative officers and division / department units.

As the units throughout the institution share one overwhelmingly broad goal of education, they, through this one common bond, share many core competencies, such as faculty interaction with students. Most divisions are identical in structure, as a senior faculty member serves as chairperson, and one or more administrative secretaries are dedicated to each unit. The divisions may have subunit departments within their framework; half of the six divisions are divided into departmental structures.

Following the identification of the units and their connection within the college, a series of interviews were implemented. Over a four-week period, eleven interviews were conducted with academic department/division chairpersons and with administrative officers of Concord College. The interviews ranged in time from approximately 20 minutes to over an hour, based upon the length and complexity of responses. Questions posed included Concord's mission, customers, competitors, goals, assets, and liabilities. Privacy of interviewees was also afforded in the interactions, with assurances of secrecy provided. This privacy insured a more open atmosphere and ability by staff to speak more frankly on any difficult issues. Additional interviews were attempted; however, due to scheduling difficulties or inaccessibility of the respondents, additional input was unable to be included in this work.

A compilation of responses was prepared after the interviews. This compilation serves as the foundation for the objectives and strategy that are to be the focus of the Balanced Scorecard for Concord College. Norton and Kaplan state, "One of the barriers to applying the scorecard to these sectors [nonprofit and government organizations (NPGOs)] is the considerable difficulty NPGOs have in clearly defining their strategy." ((Kaplan & Norton, 2001a, p.8)

From the results of the interviews, the following objectives have been established for Concord College:

Financial –

Objective: Concord College will establish $300,000 in ongoing grant funded research yearly by 2005.

Criteria: Financial support from the state is expected to continue downward trend, and the most lucrative avenues of support are through grant proposals and increased private donations. The current economic climate, as well as recent negative publicity, does not indicate a favorable time for the college to experience an increase in private gifts.

Institutional growth will also be a beneficiary of such an objective. Research grant funding provides supplies, up to date equipment, and possible additional staffing. Research will provide an area of professional growth for the faculty, as well as greater credentialing. As a result, projects could reinvigorate a staff with areas of low morale. Student involvement in such research will also stimulate the learning process, inside and outside of the classroom.

Concern: Administration should collaborate with faculty to determine strategies for grant application so the process will not become, or be viewed as, a burden to the faculty.

Internal Process –

Objective: Concord College will clearly and concisely address the role of the Beckley campus, establishing parameters and long term goals. These parameters and goals will be communicated to staff and affected students by 2004.

Criteria: Past performance indicates that the entity's role is not congruent with the Athens campus. The Beckley facility provides a large amount of revenue for Concord College, but communication between the campuses is poor. The divisions that serve the Beckley students do not clearly understand the role of the facility either. Mountain State University is viewed by the majority of staff as a competitor, but without clear goals for Beckley, Concord College will continue to be paralyzed in this area. Administration should meet with Beckley staff, as well as department and division representatives to clearly arrive at a consensus as to Beckley's role as a fact of the school.

Objective: Concord College will appoint an interdepartmental review by non-chair faculty and staff to examine all applicable policies regarding Human Resources. Any deficits should be identified, and additional or more appropriate policies should be established. The project is to be completed by 2006.

Criteria: As an in depth review may be extremely complex, the extended deadline was considered. This objective is based upon the frequency of past litigation. A foray into the legal system for the school, whether through the courtroom or in settlement, is inappropriate and costly. Any and all possibilities of litigation against the institution should be minimized, or eliminated if possible. Any minimalization in this area will serve the organization through the absence of negative coverage in the media. This absence can also lead to a more favorable response by those willing to donate to the school. It will also serve to decrease internal strife or poor morale among the staff.

Customer –

Objective: Concord will provide a laptop computer for every full time student by 2004.

Criteria: This objective will solidify Concord College's role as a traditional, yet innovative institution in the region. An increase in student fees over four years will cover the cost of the units, which will be given the student at graduation. A program of this type keeps the student on the forefront of technology, while also contributing to educational time. This provides incentive also for prospective freshmen, as Concord College's commitment to technology is witnessed daily.

Learning –

Objective: Concord will establish interdepartmental meetings and strategy sessions with the president and administration officers.

Criteria: Organization currently suffers from poor interdepartmental communication, which could be remedied through dialog between those departments, as well as administration. The meetings could provide a venue to foray into topics that may be viewed as controversial. Administration can communicate with staff more effectively, reassuring the staff that it is not an insular entity; it is a proactive force.

As this research is not binding to the institution with which it addresses, certain steps in the Balanced Scorecard remain ready to be implemented. They are as follows:

Generally, the Balanced Scorecard architect(s) would meet with the leadership representatives of the institution to further develop strategy and objectives. The purpose would be to gain an overall understanding of the stated objectives, as well gain consensus. The group would discuss each of the four perspectives and their respective objectives and measurements. An additional group meeting would further narrow the objectives, and identify the most precise measures for the objectives.

Another round of planning would involve a workshop where the individual units would present their determinations from the previous meeting. An implementation plan would then be developed to incorporate the objectives and measures within the organization, as well as communicate them across traditional hierarchical lines. Norton and Kaplan propose a new, possibly nontraditional team be formed for this purpose (Kaplan & Norton, 1996, p.308). The institutional leadership should meet a final time to integrate the Balanced Scorecard into the philosophy of the college, as well as develop a system to disseminate information to the entire staff regarding the new system of management.

With the adoption of such proposed objectives, the college must take steps to insure that implementation involves the entire organization. Kaplan and Norton reaffirm the concern that one of the pitfalls of the Balanced Scorecard's implementation is not poor design of the scorecard itself: organizational factors, such as a lack of commitment by senior management hampers the establishment of the principles (Norton & Kaplan, 2001, p.361-367). Along with senior management, individual employees on all levels must be integrated into the Balanced Scorecard principles (Kaplan & Norton, 2001b, p.3)

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Appendix A

**Concord College
Organizational
Structure**

President

Administration
Vice Presidents

Division of Business & Economics	Division of Education & Human Performance	Division of Fine Arts	Division of Languages & Literature	Division of Natural Sciences	Division of Social Sciences
	Education Human Performance			Biology Mathematics Physical Science	Social Work Program Recreation & Tourism MGT
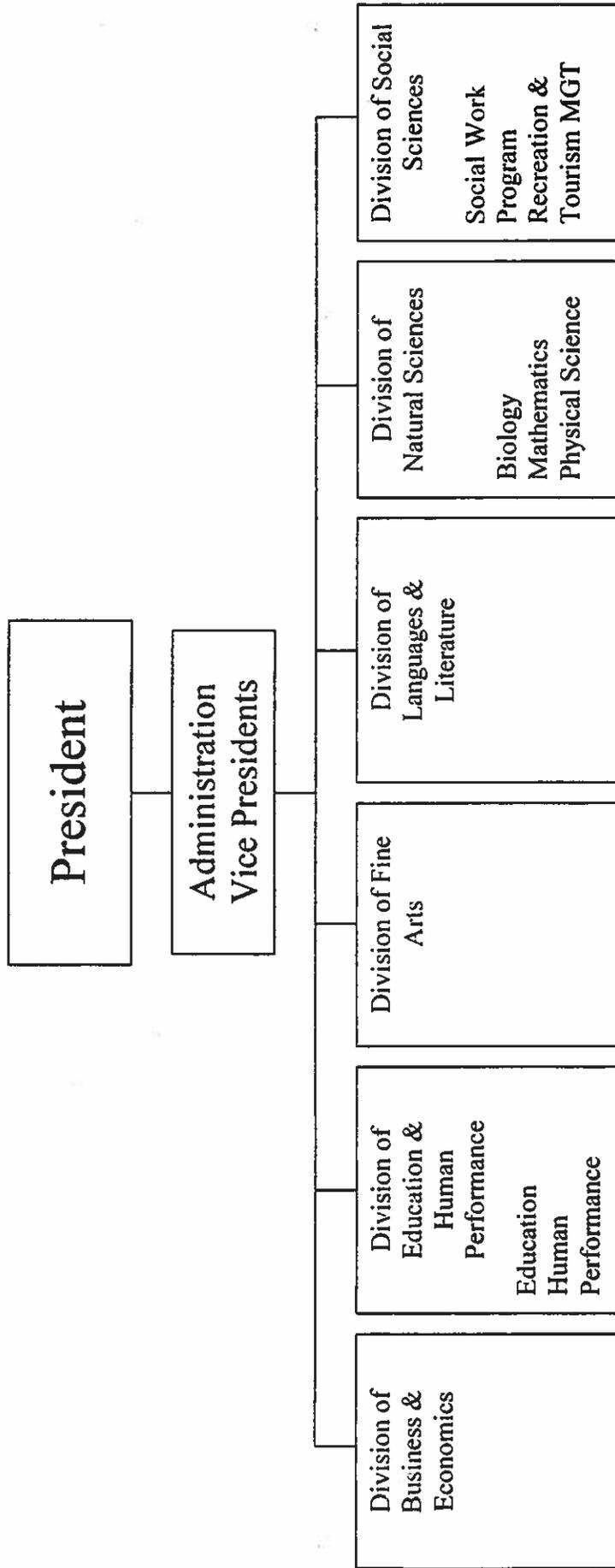
Ronald E. McNair Post-Baccalaureate Achievement Program
White Hall, D-145
Concord College
Post Office Box 1000
Athens, West Virginia 24712-1000

President
Concord College
PO Box 1000
Athens, WV 24712-1000

November 4, 2002

Dear President;

My name is Michael O'Dell, and I am a senior at Concord College, majoring in business management. I am currently involved in the McNair Scholars Research Program, and my research topic concerns the application of the Balanced Scorecard Principles to the college itself. The Balanced Scorecard (BSC) is a business measurement tool that assists an organization in narrowing its direction and focus. I will be setting up such a tool for Concord.

This tool provides more information regarding an organization than just "the numbers." The BSC examines how to improve an organization through a four faceted approach:

- Financial perspective
- Customer perspective
- Internal-Business perspective
- Learning & Growth perspective

The main approach to examining an organization with the BSC is through the interview process. I would appreciate some of your time to talk about your experience with Concord College, and what goals you see on the horizon for the school. The input of an organization's "management" is essential to determine its direction. When I finish with my research, I will be more than glad to provide you a copy.

In the coming weeks, I will be contacting your office to schedule an appointment with you. This interview should take less than 45 minutes, and I will be happy to accommodate your busy schedule. Thank you.

Sincerely,

Michael O'Dell

Appendix B – sample of interview questions

INTERVIEW:_____ DATE: _____

What, in your opinion, is the goal of Concord College?_____

_____

_____

Who are the customers of Concord College's services?_____

_____

_____

What are the competitors of Concord College?_____

_____

_____

Which competitor is the greatest threat to Concord? _____

_____

_____

What direction do you see your department, division, center, the school heading in the next 2 years

_____

_____

_____

In the next 10 years? (What one goal would you like to accomplish in this time?)

_____

_____

_____

What is the one biggest problem / roadblock to achieving your department's / division's goals? _____

_____

_____

How can you alleviate that roadblock? How can your department remove that roadblock? _____

_____

_____

_____

What would you consider the staff's (and Concord's) strongest asset? _____

_____

_____

_____

What would you consider the staff's (and Concord's) greatest liability? _____

_____

_____

_____

Is there one suggestion that you believe would make Concord College more attractive to prospective students?

_____

_____

_____

Appendix C – Compilation of interviewee responses

Most respondents identified the goals of Concord College similar to that of the mission statement:

"*The mission of Concord College is to provide quality, liberal arts based education, to foster scholarly activities, and to serve the regional community.*

Concord College provides rigorous programs, primarily at the baccalaureate level, which prepare students to pursue various graduate study and career options and to assume leadership and professional roles in a multicultural society. While we incorporate a variety of educational methodologies/technologies, our size and the caring dedication of our faculty, staff and administration are the principal assurances of a quality educational opportunity at Concord College.

As a learning community, Concord College is committed to furthering knowledge through professional development activities and programs, through research, and through the application, publication and appreciation of scholarly efforts.

The primary purpose of Concord's mission is academic; however, the service the College provides to its state and region goes beyond the classroom. Concord College contributes to the quality of cultural and economic life in southern West Virginia through collaboration with both public and private organizations and agencies and through extension of its support and assistance into the region it serves.

Ultimately, Concord College measures its success by the fulfillment alumni find in their careers and throughout their lives." (Catalog, 7)

Many referenced the mission statement, and offered the importance of the higher education offered to southern West Virginia, and secondarily, to other parts of the region and world.

Customers of Concord College

Respondents differed greatly in the determination of Concord College's customer base. Over 81% identified the southern area of the state or the people of West Virginia as Concord's customers. Students were identified by over 54 % as customers, while 36% objected to the term, mainly when applied to students. Staff and faculty, as well as donors, were identified in much smaller percentages.

Competitors

Competitors are viewed as the following:

Mountain State University	55%
Marshall University	45%
West Virginia University	45%
Bluefield State College	36%
Bluefield College	18%
West Virginia State College	9%

West Virginia Wesleyan College	9%
West Virginia University Institute of Technology	9%
Online / distance learning	9%

Additional remarks included the following: support from the state of West Virginia forces Concord to compete with sister institutions, as well other state entities. There was also an objection to the term, as the college cooperates with other higher learning institutions. Although Mountain State University was considered the biggest competitor, many respondents did not view it as a serious one

Threats

A question regarding the greatest threat to the institution was posed as well. Various answers were provided.

The presence of Mountain State University was again apparent, with 27% of responses indicating the Beckley institution. However, perceived differences regarding the level of education provided as opposed to Concord College's level of education relegate this to a threat of minor proportion. The state of West Virginia is also viewed as one of the largest threats. Individuals or entities included in this category would include the governor, legislature, and the higher education Chancellor. Responses included that they were threats mainly due to the poor financial conditions facing the state and higher education system, as well as the current policies in place. West Virginia University is also viewed as one of the greatest threats to the institution, due to the influence of the institution on state policy, as well as its image, real or perceived, as the premiere higher education entity in the state. Concord College is also perceived to have no threat whatsoever, as no college competes on an academic basis.
Concord College itself is also its greatest threat, stated some respondents. An inability to make effective decisions, internal problems, and a large lack of communication hamper the organization in meeting its goals.

Direction in 2 years

The interviewees provided a broad range of responses as to the direction of the department / division / institution in the next two years:
Several view the establishment of a Master's degree program as a great benefit, while others determine the expansion as an additional burden on already overworked staff. Some also do not believe their respective department goals are in line with a post baccalaureate program, and do not expect any additions to staff, so the undergraduate programs will suffer as a result.
Many would expect the integration of technology into the learning process, even for programs that may not traditionally be compatible with such advancements. Departments and divisions plan to continue ongoing reviews of their programs and courses offered, and make any additions, deletions, or modifications necessary. More facilitated learning for students, professionals, staff and faculty should have focus in the coming years also.
Concerns regarding the current state fiscal condition also provided response. Some respondents viewed the next two years as uncertain due to budgetary decreases. Maintaining current

enrollment numbers and finding financial stability were also communicated, although any perceived improvement in resources was deemed negligible.

10-year goals

Ten-year goals of the respondents for the institution also varied. Additional technology in the classroom was offered, as was the possibility of long distance learning on a limited basis. Staying up to date with the changing face of technology was remarked, as well as improved equipment for students in various departments. Continued focus on maintaining national certifications, while achieving new ones, would provide another avenue of academic strength. Ongoing review of programs will continue, and student / faculty ratios need to be decreased. Concord College should position itself to become one of the strongest academic institutions in the Appalachian region. Many of these changes should be embraced, yet the college should strive to maintain its academic integrity.

Roadblocks

When asked about the largest problem to achieving the department / division / institution goals, the following answers were provided by the interviewees:

The main topic discussed approached by 45% of the respondents was lack of funding and / or money. It included not only additional staff, but also supplies, equipment, travel, and staff development. Additionally, the difficulty of being a state institution provides frustration and problems. The difficulties between the Athens and Beckley campuses were highlighted. Beckley campus was referred to as a "cash cow," but many do not understand the mandate, parameters, or its role as a part of the institution. Clear and concise input from administration is not presented the staff regarding staffing and other issues concerning Beckley. The institution constantly experienced a resistance to change, and staff was completing duplicate tasks, dealing with bureaucracy, and spending time doing things that do not benefit constituents. Another believes that imagination and creativity, the ideals to facilitate people to think, are overlooked tools. Departments and divisions perceive uncertainty that there is full support from administration, and possibly the state, for what is being planned and accomplished. The final problem is that of interdepartmental communication. Within the departments, communication is not cited as a problem. Between departments, departments and administration, and among campuses, there is a perceived gap of communication. Overall morale is suffering under the strain of budget cuts, overwork, and deteriorating facilities. It is perceived that administration does not care, and only becomes more insular when problems arise.

In alleviating or eliminating the roadblocks

Development of the Concord College Foundation to alleviate money woes could be a beginning. The college needs to determine the location of "that place" in student charges and fees that will achieve balance of bringing in additional revenue, but not raising the charges too high. With shortfalls in the budget, Concord must look outside the institution for additional funding, as well

as asking students for more support. It depends upon the staff having time to do it [acquiring funding], as additional man-hours are not available for an overworked staff. Department could apply for grants, but the staff is overworked, and asking them to apply for grants is too much.

Additionally, promotion of funded research would be an avenue to further explore. The level of expectation of everyone involved with Concord also needs to be raised, including staff, students, and administration. Departments should establish stronger ties with administration, and this should be reciprocated by the administration itself. The institution as a whole should identify avenues for people to let their imaginations run, and create the discipline to do something about initiating those ideas. Thought that I could, but [I] have given up – stopped trying. Communication needs to be increased, and departments are constantly changing to attempt to alleviate many problems. It is out of our hands; it depends upon the state. When we talk about where we want to go, it turns out to be a money matter. It shouldn't be.

The institution's greatest assets

All respondents cited the staff of the institution as one of its strongest assets. Descriptions included a strong work ethic, dedication, superb credentials / qualifications, and an overall level of caring by the majority of staff. Students were also listed as strong assets by 27% of the respondents, and alumni were also included in other remarks.

The institution's greatest liability

The greatest liability is ourselves; we are not always civil to each other. The institution looks to others (i.e. Charleston, the government, etc.), assuming they have the answers. We do not have the confidence to stay the course, as we are staying perpetually reformed. The organization is too overcome to learn from the new faculty; old faculty calls the shots. New faculty is either integrated into the mindset, or they leave. Senior faculty chairs all committees: people who do not use computers determine technology. There is an inability to have a vision on the part of the leadership, and when there is one, there is an inability to communicate it; wraps around the inability to communicate. The greatest problem is the lack of funding and resources. There is a small number of staff that is unhappy and overly vocal. They cause disruptions for the entire institution, creating barriers to the institution's goals, and the good things that are going on here. There is no communication by administration to faculty; faculty finds out after the fact. The average Princetonian or Bluefield resident may not understand what we do, and ultimately has no use for it. We are possibly viewed as intellectual snobs by the whole region.

The insular nature of the institution is a liability, as people at Concord for years who don't know what's going on. It's a naiveté that pervades the institution. They're afraid of change, and they are costing Concord in a number of ways. Don't abandon tradition, but evaluate new opportunities and challenges, instead of sticking head under the covers. Apathy is the greatest liability, since there is no reason to do anything but to work and go home. The human resource department does not understand the concept, as the institution experiences lawsuit after lawsuit. Being overworked is the greatest liability: enrollment grows and the staff

decreases. It is difficult [with regard to financial cutbacks] not to be able to do the things that the institution is designed for.

Suggestions on making Concord more attractive to prospective students

Concord does a good job marketing locally, but needs to build a clearer brand for Concord and market it, whether through current and former students or the good things going on at institution. Expansion into foreign languages, as there is a great need for them. Distance learning, possibly not for all course areas, but especially for professional development. Need to value substance over appearance. Do we need students graduating with degrees who cannot acquire positions? Faculty has the commitment, but the commitment is not backed up: needs to start from administration. It needs to be a top-down change. There is a growing need for civility on campus.

Our attraction now is the personal interaction, and availability of staff for the students. This is how we overcome other deficits in the institution. The modernization of buildings would attract students, as well as technological updates. Prospective students see computers being used daily, which high schools have better equipment. The Fine Arts building needs some major repair, and other buildings need small, but regular maintenance. Such maintenance is slipping through the cracks. The entire capital improvement budget has been used on the mold situation. The institution should offer a wider range of quality academic programs; fields including engineering or pre-engineering and healthcare, which are high in employment potential. The institution needs a greater visibility of faculty – scholarly superstars, who publish. Provide a more balanced approach to the disbursement of scholarships, as 96-98% of the $1.7 million in funding is awarded to incoming freshmen. Very little is merit-based: if you don't get it when you arrive, you won't get it. Excelling students are not rewarded or recognized through financial support; however, academically attractive prospective students are "bought" by the institution. The college should adapt programs to more reflect the shifting market segments. The quality of graduates is what matters in the long run, as 30% of students have had some contact with Concord alumni, which has affected their determination to attend here.

Proposal

THE PROBLEM AND ITS SETTING

The Statement of the Problem

Through application of the Balanced Scorecard principles, what strategies should Concord College choose to provide the most effective means of long-term accomplishment of its goals?

The Subproblems

The first subproblem. How can the financial strategies used by Concord College be analyzed to provide a more effective and efficient delivery of services?

The second subproblem. What is the best way to offer the most effective services for Concord's customers?

The third subproblem. How can Concord College satisfy its customer's needs through utilizing an internal business process perspective?

The fourth subproblem. In what way can Concord College further examine its learning and growth perspectives to more effectively serve its customers?

The Delimitations

The research will apply only the principles of the Balanced Scorecard to Concord College: no other business measurement will be included.

Only Concord College and its undergraduate services, staff, policies, and customers will be studied, as no other entities will be included in the research. Any post-baccalaureate programs in development will be considered.

The Definition of Terms

Balanced Scorecard – The Balanced Scorecard is a managerial application that focuses an organization's strategies for long-term success and effectiveness. Developed by Robert Kaplan and David Norton, the concept is comprised of a four-facet approach in the review and analysis of the following:
1. Financial – monetary policies of the organization
2. Customer – identification by management the customers being targeted by the organization
3. Internal business – identification of business delivery processes that better serve the customers and the shareholders of the organization
4. Learning and growth – applies to the employees, systems, and motivations within the organization, which allows the other three facets to be implemented. This facet provides the infrastructure for the delivery of the entire plan.

Abbreviations

BSC is the abbreviation often used for the Balanced Scorecard.

EVA is the abbreviation used for economic value added principle.

Assumptions

The first assumption. Concord will continue to act as a West Virginia public college, and not become a university or other educational classification.

The second assumption. The college will maintain its current undergraduate level and offering of standard courses and degrees.

The Importance of the Study

This study will serve as a model for Concord College to review and analyze its current and future strategies for a measure of accomplishment, efficiency, and effectiveness. The Balanced Scorecard will identify strengths and weaknesses of the organization to assist management in making more informed choices for long-term stability and growth. The long-term goal is not only the identification of the customers, but also the service of their needs.

REVIEW OF LITERATURE

Bailey, Allan R., Chow, Chee W.. Haddad, Kamal M. (1999). "Continuous Improvement in Business Education: Insights From the For-Profit Sector and Business School Deans." Journal of Education for Business, 74, 165-180.

The authors of this study provide insight and the basis for the application of the balanced scorecard to non-profit entities, such as collegiate level business schools. Deans queried were heads of schools involved with the American Assembly of Collegiate Schools of Business (AACSB). Questionnaire responses of the randomly selected administrators revealed a perceived value to the balanced scorecard.

Cameron, Preston. (2002). The balancing act: Even in today's volatile economic climate, many organizations are turning to the balanced scorecard to help steer their organizations in the right direction." CMA Management, 75, 28-32.

The work highlights the Alabama Department of Mental Health and Mental Retardation, and its usage of the balanced scorecard principles. The agency operated with "a budget of nearly $450 million . . . and a clientele of over 170,000 individuals."

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This cites an example of a not-for profit governmental entity that utilized a strategic measurement system such as BSC.

Ehrbar, Al. (1998). *EVA: The Real Key to Creating Wealth.* New York: John Wiley & Sons, Inc.

Economic value added, or EVA, provides a measure that works in conjunction with the balanced scorecard. Profit is not realized until the investment in capital is recovered. Application of this concept provides the organization with a more focused view of the true value of the firm. BSC's creators agree that this principle assists their measure in more keenly reviewing an organization and its strategies. It was included to provide a basis for that framework.

Kaplan, R., Norton, D. (1996). *The Balanced Scorecard: Translating Strategy into Action.* Boston: Harvard Business School Press.

This is the initial book that was produced by the authors. It established the concept of the Balanced Scorecard Principles, or BSC. An organization is analyzed through approaches other than the traditional perspective of finance. This measurement also considers the customer service aspect of the firm, as well as the internal organizational structure. This book is considered the cornerstone of the BSC approach in business and other disciplines. Additional works and articles have been based upon this hallmark measurement. The BSC application for Concord College will be based upon the framework set out by the latter chapters of the book.

Kaplan, R., Norton, D. (2001). *The Strategy Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment.* Boston: Harvard Business School Press.

A sequel to the original *Balanced Scorecard* book, this further examines the relationship between organizations and the BSC applications. A variety of firms are highlighted. Nonprofit and governmental organizations are addressed more in this work than the earlier one. There are some updated ideas, which include a stronger focus upon the establishment of strategies for the organization.

Kaplan, R., Norton, D. (2001a). "Transforming the Balanced Scorecard from Performance Measurement to Strategic Management: Part I." *Accounting Horizons*, 15, 87-101.

Providing a compact version of *Strategy Focused Organization*, the article addresses nonprofit and governmental organizations (NPGOs). As this is a growing area of BSC application, the article explained some of the difficulties specific to NPGOs. The main problem appears to be the identification of the customer, which is difficult to determine. [With Concord College a nonprofit / governmental entity, the article firmly addresses the topic, and should be included in the research.]

Kaplan, R., Norton, D. (2001b). "Transforming the Balanced Scorecard from Performance Measurement to Strategic Management: Part II." *Accounting Horizons*, 15 i2, 147.

The article compliments the *Strategy Focused Organization*, and addresses the five principles within the framework to further the application of BSC. Apart from the restatement of the five principles, the authors state the usefulness of activity based costing and economic value added principles to the balanced scorecard measurements.

Malina, Mary A., Selto, Frank H. (2001). "Communicating and controlling strategy: An empirical study of the effectiveness of the balanced scorecard." *Journal of Management Accounting Research*, Annual 2001, 47-91.

The balanced scorecard principle is considered a sound concept, yet is questioned regarding the tension and pressure placed upon executives or upper management due to a lack of communication. This review was one of the few works that examined weakness in the balanced scorecard. Although I viewed the information to be potentially flawed due to links between the author and executives of the company studied, it provides another approach to BSC. It addresses some communicative concerns that Concord staff and administration could pose or experience regarding BSC.

A. The research methodology for Concord College will be followed as suggested for all organizations in *The Balanced Scorecard: Translating Strategy Into Action*, by Robert Kaplan and David Norton.
B. The specific treatment of the data for each subproblem
    a. How can the financial strategies used by Concord College be analyzed to provide a more effective and efficient delivery of services?
    b. What is the best way to offer the most effective services for Concord's customers?
    c. How can Concord College satisfy its customer's needs through utilizing an internal business process perspective?
    d. In what way can Concord College further examine its learning and growth perspectives to more effectively serve its customers?
        i. The data required for the balanced scorecard application will be acquired from interviews with the administration of Concord College, as well as the department chairpersons. Additional persons included will be the director and staff of the Beckley Center for Concord College. Topics will include but will not be limited, to the following: up to four suggested objectives for each of the BSC facets; customer identification and customer service; competitors, and communication. Apart from interviews, schools of higher education within 100 miles of Concord College will be contacted for the services and programs offered that may mirror the services and programs of Concord College.
        ii. The location of the data is mainly accessed from persons at the main campus of Concord College in Athens, West Virginia. Additional staff are located at the Beckley Center, 219 North Kanawha Street, Beckley, West Virginia. Competitor information will either be housed at each higher education facility, or will be available through its particular web site.

iii. The means of obtaining the data - The interviewees will be presented prepared information regarding the balanced scorecard, as well as information regarding Concord College's mission and operational strategies. Identical questions will be asked of each interviewee; however, the interview will not be specific to time length. The interviewees will receive assurances that all responses are private and confidential

iv. The data will be compiled from all of the interviewees. The most pertinent responses will be included in the formulation of a maximum of four objectives: they will include each of the four balanced scorecard perspectives, detailed in the sub problems, as well as possible measurement forms.

C. The qualifications of the researcher. The researcher is a senior, attending Concord College, with a major in Business Management.

PROPOSED STUDY OUTLINE

I. Exposition
- a. Overview of balanced scorecard
  - i. History
  - ii. Applications
- b. Overview of Concord College
  - i. History
  - ii. Current College
II. Materials & Methods
- a. Selection of subjects
- b. Description of interview questions
III. Findings
- a. Compiled interview question results
- b. Proposed strategies

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Malina, Mary A., Selto, Frank H. (2001). "Communicating and controlling strategy: An empirical study of the effectiveness of the balanced scorecard." *Journal of Management Accounting Research*, Annual 2001, 47-91.

Appendices

- Proposed Balanced Scorecard perspectives for Concord College
- Organizations of higher learning within 100 miles of Concord College, and similar education/ degree programs.

Timber rattlesnake ecology of southern West Virginia

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May 2, 2001

ABSTRACT

Rattlesnake ecology has not been extensively studied in southern West Virginia. As a result, very little is known about rattlesnakes in West Virginia. The objective of the project was to determine the areas in which the timber rattlesnake (*Crotalus horridus horridus*) was present or absent. Such data are critically needed before we can protect this rapidly declining species. Data were collected by surveying areas previously known to harbor snakes and by looking under potential cover such as rocks, logs, and leaf litter. The position of the snake was recorded using a handheld Global Positioning System (GPS); positions where no snakes were found were also noted this way. This project was designed as the continuing step of the initial project started by one of us (Ronald Canterbury) in the late 1980s. Historical data from this latter study showed a range of 16 rattlesnakes per 100 person hours at the Guyandotte mountain site to 0 rattlesnakes per 100 person hours at the Bluestone State Park site. Differences among the historical sites were quantified using Geographical Information Systems (GIS). Multiple linear regression showed study site size and forest age were significant predictors of the number of rattlesnakes found in a study plot. Conversely, analysis showed locality and habitat type were not significant predictors of the number of rattlesnakes found in a study site. The procedure of GIS allows mapping of the study sites such that the topographical and vegetation differences among them may be compared. The elevations, watersheds, roads, power lines and the number of snakes per 100 person hours were all noted on the GIS maps. Future studies and comparisons using the GIS maps produced will be used to develop conservation strategies beneficial to the timber rattlesnake ecology in southern West Virginia.

1

INTRODUCTION

Rattlesnake ecology has been the focus of several studies. Klauber (1982), for example, describes their habits, life histories, and interactions with man. Brennan (1995) studied rattlesnakes in north central Pennsylvania and helped to get the timber rattlesnake listed as endangered in Pennsylvania. Porter (1972) thinks that the negative image of all reptiles is a result of grossly exaggerated folklore passed down through generations. Porter also reported that venomous snakes represent only a fraction of the total population of snakes in America and only minor harm has been caused due to these vertebrates worldwide. For example, worldwide mortality from venomous snakes is about one per 100,000 of population per year. Parrish, cited in Porter (1972), found that during the period for which he had data (1950-1954) there were more deaths caused from the stinging of bees than by the venomous bite of a snake. We must also realize at this time there were far more snakes in the United States than presently, especially rattlesnakes. The timber rattlesnake (*Crotalus horridus horridus*) is declining in many states (Tyning, Massachusetts Audubon Society, in litt.). Reasons for the decline vary, but include over collection, malicious killing of the species, sport hunting, and loss or alteration of habitat.

The study of rattlesnake ecology in southern West Virginia is a relatively new area of research. The focus of this study was on the timber rattlesnake, and the components of its habitat. The purpose of this research project was to survey for presence or absence of timber rattlesnakes and look for places that may still harbor significant breeding populations for conservation. Such data are essential before sufficient conservation projects can be developed. The timber rattlesnake is an environmental indicator species, which if threatened indicates an unstable environment. According to Pauley and Green (1987), the timber rattlesnake population was widely distributed throughout

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West Virginia. Pauley and Green (1987) reported that highway construction, development of recreation areas, deforestation, and forest fires have reduced the timber rattlesnake population, and the species has been extirpated in many areas of West Virginia. Today, it is critically imperiled and declining precipitously.

Conservation of the timber rattlesnake is essential to science, because it is a model organism for scientific study (Beaupre and Duvall 1998). Scientists label an organism as a model for comparative studies if they possess three attributes. These include shared derived and novel attributes that can be measured. For example, model organisms should possesses attributes or undergo processes common to a more inclusive taxon. Also, model organisms provide examples of novel adaptations in heterogenous environments. Characters of model organisms are often easily measured and quantified (Huey et al. 1982). Rattlesnakes have recently become a principle model in ecophysiology and meet all three criteria listed above. Reptiles, in general, have long functioned to imply the links between physiology and ecology, thus representing a larger taxon. Rattlesnakes have one of the highest, if not the highest, biomass conversion efficiencies (novel, shared derived trait) known (Beaupre and Duvall 1998). However, rattlesnakes, like other reptiles, are poikilothermic and reliant on anaerobic metabolism (ancestral trait) for high activity energy (Pough 1983). Therefore, rattlesnakes can provide new insights into the common problem of thermoregulation, and the evolution of a derived feature (efficient digestive physiology) built upon a common bauplan. Finally, the aforementioned characters are measurable via bomb calorimetry, radio and temperature telemetry, metabolic rate studies, and chemical analysis along with various other techniques (Beaupre and Duvall 1998).

These studies cited above are only brief examples and are not an exhaustive list. However,

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they demonstrate the usefulness of the rattlesnake as a model organism. Studies of the complex relationships between rattlesnakes and their ecosystem are rudimentary, however. Therefore, integrative studies of this organism will benefit the inclusive taxon represented by the rattlesnake integrative organismal model.

MATERIALS AND METHODS

STUDY SITES

Study sites chosen for this research are located in southcentral West Virginia and are known to harbor populations of timber rattlesnakes (Pauley and Green 1987, Canterbury, unpubl. data). The study sites are in the Allegheny Plateau Physiographic Province and are characterized by reclaimed surface mines bordering oak-hickory, maple, and mixed deciduous forests. According to Canterbury et al. (2001), most of these sites are second-growth forests as a result of natural succession and reforestation procedures. Transitional ecotones between forest-road and shrubs occupied most of the edges of the historical study sites (Canterbury et al. 2001). The edges were contour-mined and reclaimed with black locust and red maple (Canterbury et al. 2001).

DATA COLLECTION

The project involved sampling for snakes along Guyandotte (Bolt) Mountain in Wyoming and Raleigh counties (see Canterbury et al. 1993) and quantifying the number of snakes across 40 additional historical sites (see Canterbury et al. 2001). Four historical study sites were mapped using Geographical Information Systems (GIS). GIS was used to visualize the spatial relations between elevation and human influence such as roads, railroads, power lines and buildings, and the population density of rattlesnakes in Southern West Virginia. Using digital topographical maps, the study areas were outlined. Elevation contours were then added along with streams, roads, railroads, power lines,

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buildings and other geographical markers. The population densities of rattlesnakes, obtained by the previous studies of one of us (R. Canterbury), were then added to the maps, i.e. number of rattlesnakes per 100 person hours. The human population of the study areas was not considered because human influence may occur by persons not inhabiting the area, i.e., snakes are often killed by individuals using ATVs, who visit these areas for recreational use (Canterbury unpubl. data).

Along the Bolt Mountain site, we searched for the timber rattlesnakes by walking trails and strip roads and looking under typical cover areas such as rocks and logs. We searched for snakes from May through early October and only during favorable weather conditions; i.e., no surveys were conducted during cool, wet weather. We recorded the number of timber rattlesnakes per 100 person-hours. Upon finding a timber rattlesnake the area was flagged using environmentally safe flagging tape and later the locality of the snake was recorded with a Global Positioning System (GPS). Places in which no timber rattlesnakes were found were flagged and the locality recorded in the same fashion. This was done in order to compare the places inhabited by timber rattlesnakes and those not having snakes. The coordinates, representing the locations at which rattlesnakes were and were not found, were plotted using Garmin MapSource 3.02 software.

Random samples were obtained and compiled from the historical dataset obtained by one of us (R. Canterbury). The 41 historical study sites were assigned site numbers and each type of habitat (riparian, old field, deciduous forest) was assigned a number based on the observations of the researcher in the field. This provides analysis of relative abundance across habitat types. We used multiple regression analysis to predict number of snakes from locality (site number), forest age (years of secondary succession see Canterbury et al. 2001), habitat type, and size of surveyed sites. Size of historical study plots were determined by plotting GPS coordinates on a topographical map and

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using an overlay grid of 1 ha blocks (n=99) to estimate amount of land surveyed (see Canterbury et al. 2001).

RESULTS

The multiple regression model predicting number of snakes (the dependent variable) from locality, forest age, habitat type and size was significant (R^2=0.50 and p=0.011). Analysis further shows forest age (p=0.021) and study site size (p=0.0001) were significant predictors of the number of rattlesnakes found. Table 1 shows the inverse relationship between age of forest and number of snakes found, and conversely the direct relationship between size of study site and the number of snakes found. That is, as the forest becomes older, the population of rattlesnakes decreases and as the size of the study site increases so does the number of snakes found. These relationships are represented by the -0.307 and 0.673 standardized regression coefficients, respectively. The independent variables of locality (p=0.217) and habitat type (p=0.345) were not significant predictors of presence or absence of rattlesnake populations in our model. This is reflected by their p-values and their low standardized coefficients of (-0.152) and (0.117), respectively. Additionally, the scatterplot (Figure 1) of study site size across the number of snakes found per 100 person-hours supports the hypothesis that size of study site affects the number of snakes found. The number of snakes found per 100 person hours across the age of the forest is represented by a second scatterplot (see Figure 2).

In 2000 (21 June through 3 October), we found only two snakes at Peachtree Ridge and three snakes at Ivy Knob of Bolt Mountain (Figures 3-4). GIS and visual field surveys show substantial man-induced fragmentation of this and other study areas (Canterbury et al. 2001, and see Figures 5-9B). That is, the presence of many buildings, roads, and power lines may contribute to the decrease

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quality and quantity of habitat available to timber rattlesnakes. Also, human impact was observed by the large amount of garbage dumped onto the land along the study site. Garbage varied from paper, dilapidated refrigerators, automobile parts, and shotgun shell casings (list not inclusive). With each subsequent day spent in the field we observed an increase in the amount of garbage. While surveying Peachtree Ridge, we noted a considerable increase in the use of ATVs by individuals on this particular strip as compared to previous field observations. Use of these mine sites for dumping and recreational activities results in killing rattlesnakes when snakes are seen along roads (Canterbury, unpubl. Data). This indicates that increased interaction with humans potentially decreases rattlesnake populations.

DISCUSSION

The results of this project reveal a significant correlation between age and size of forest and the number of snakes found. Thus, the size of a study site is directly proportional to the number of rattlesnakes it can harbor. However, this also means that increase fragmentation (via urbanization, logging, or private recreation) results in the loss of additional rattlesnake habitat. Canterbury (unpubl. data) has noted that developers and foresters kill many rattlesnakes.

The independent variable of forest age is inversely proportional to the number of rattlesnakes found per 100 person hours. Thus, as habitat ages and approaches climax vegetation, fewer snakes will be found. This supports the hypothesis that rattlesnakes mostly inhabit forest edge ecotones, for as the forest matures the rattlesnake must relocate to the newer outer edge microhabitat. Logging and urbanization influence the rattlesnake population with regard to this variable as well. Logging companies select the older trees to cut, and as they move through the forest exploiting trees they also kill or force out the inhabiting rattlesnake population.

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Future studies in this area should be conducted to provide more information about the entire ecosystem of the timber rattlesnake. Studies should include small mammal populations, temperature variations, and radio telemetry of the rattlesnakes. This information is essential to the determination of the rattlesnake population in southern West Virginia and its status. In most states in which the timber rattlesnake is listed endangered, the aforementioned variables of the ecosystem were incorporated into these previous studies. Practically all of the methods used to monitor snakes (e.g., radio telemetry) are costly and very time consuming. Thus, recent recommendations advocate the GIS/GPS approach we used. We are currently working on (1) microhabitat studies and (2) conservation efforts, which may help us understand and preserve timber rattlesnakes. In this study, we explained only 50% ($R^2 = 0.50$ in Table 1) of the variation in the number of snakes observed across 41 sites. This leaves approximately half of the variation in the number of snakes across our study sites unexplained. Therefore, we recommend additional GIS approaches coupled with field surveys.

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Table 1. Multiple regression analysis of number of snakes on location (site number), habitat, forest age and size. $R^2 = 0.50$, $F = 8.919$, $p < 0.0001$.

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	5.158	1.913		2.697	.011
SITENO	-4.971E-02	.040	-.152	-1.258	.217
HABITAT	.156	163	.117	.956	.345
AGE	-5.167E-02	.021	-.307	-2.410	.021
SIZE	5.531E-04	.000	.673	5.330	.000

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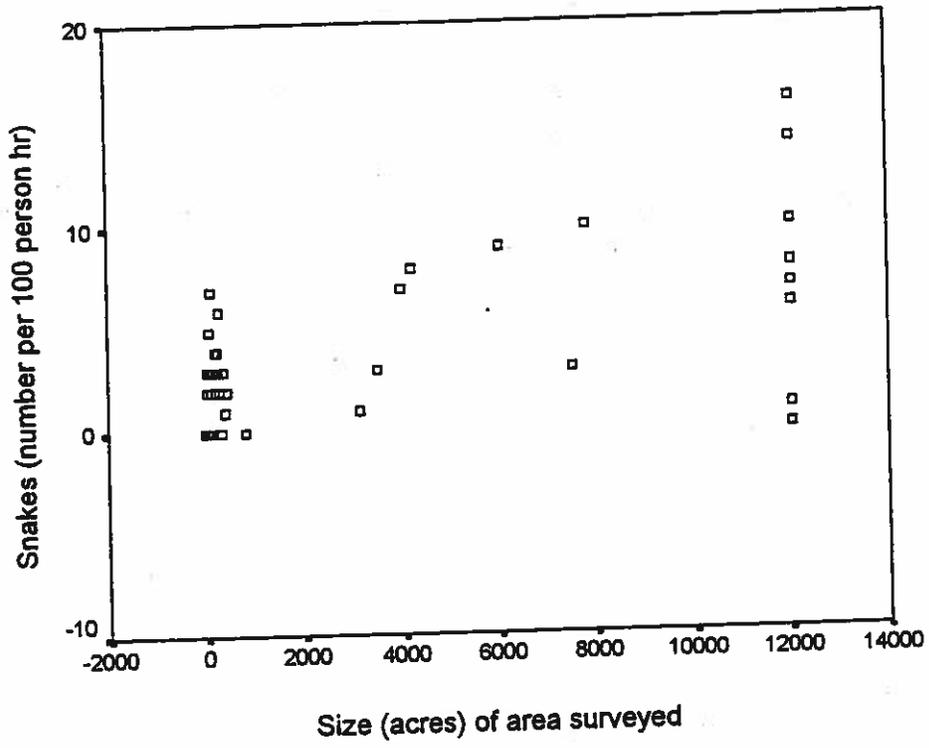
Figure 1. Scatterplot of number of snakes across size of study plots.
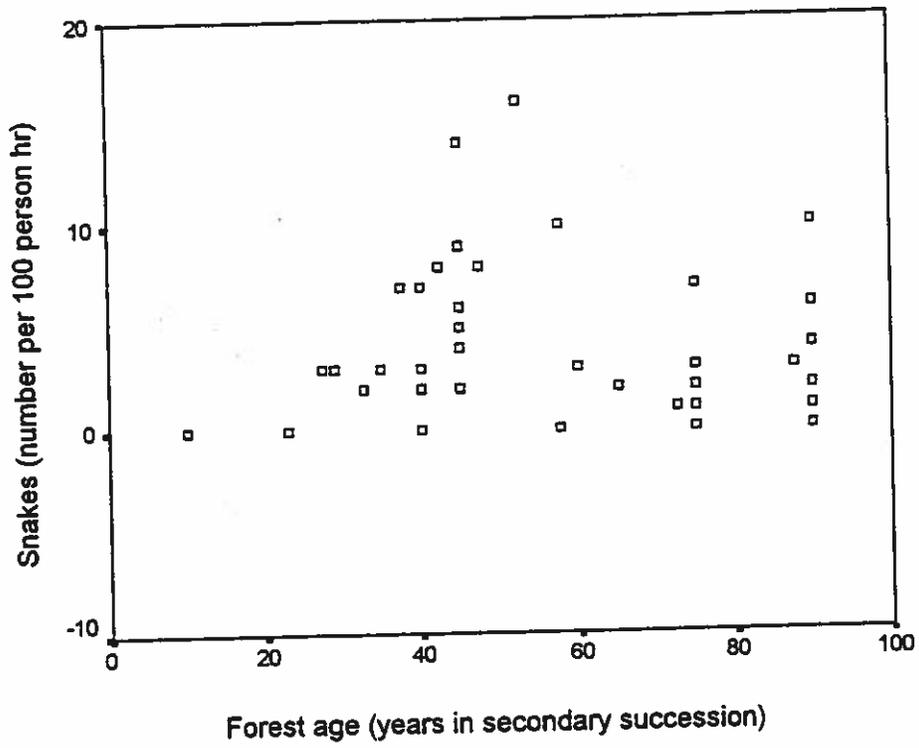
Figure 2. Scatterplot of number of snakes across forest age.
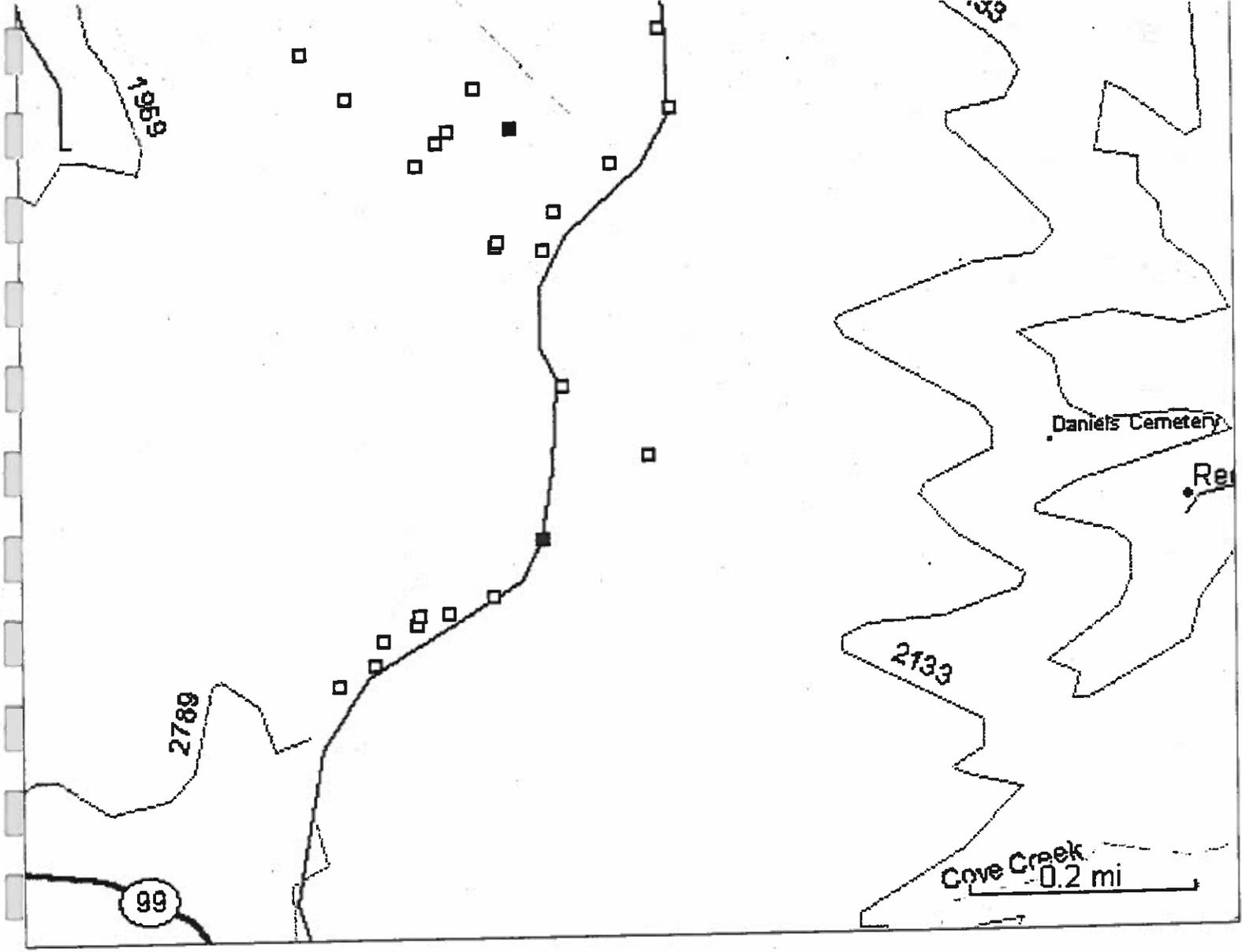
Figure 3. Localities of snakes at Peachtree Ridge, Guyandotte (Bolt) Mountain, Raleigh County during the year 2000 survey.

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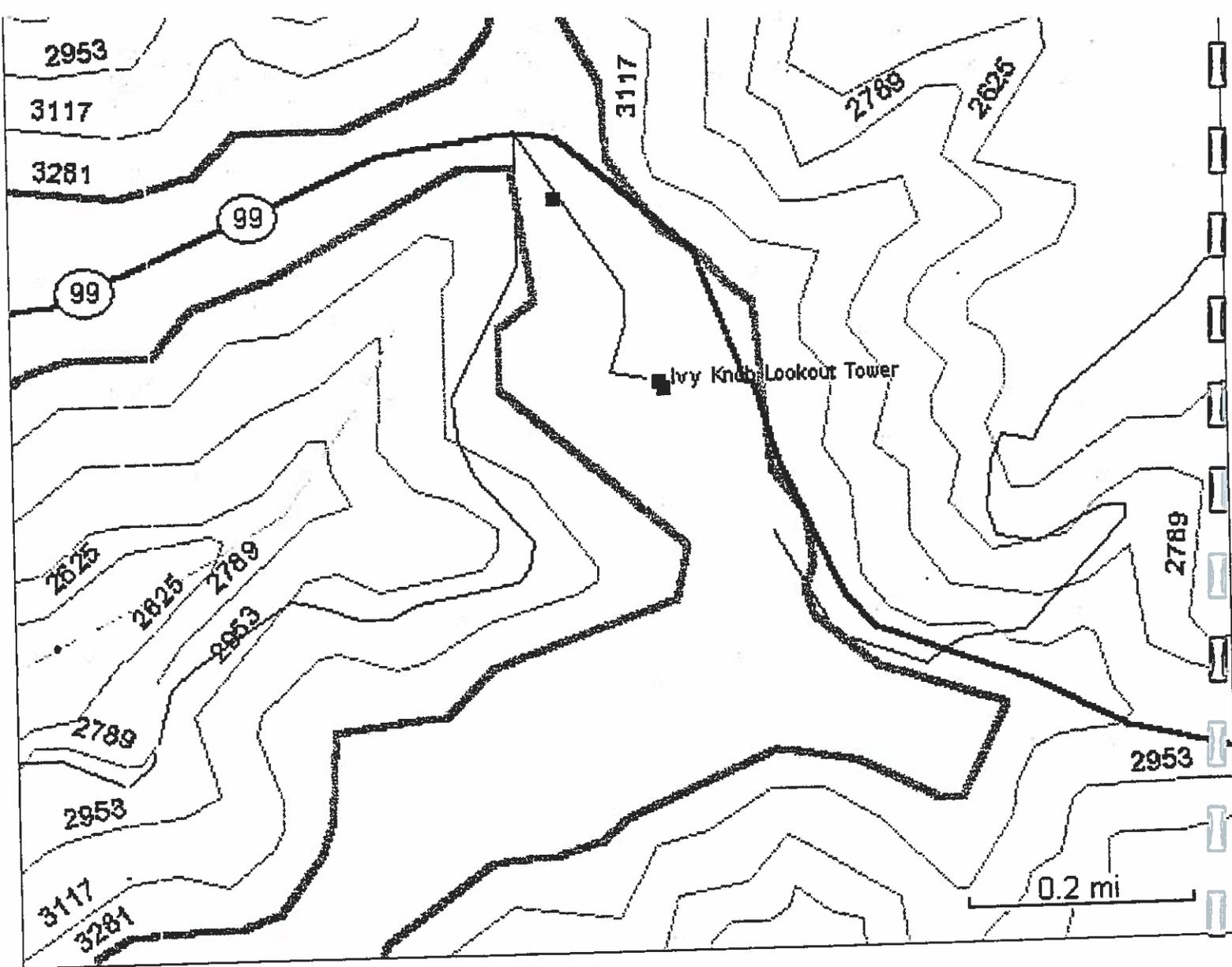
Figure 4. Localities of snakes at Ivy Knob,
Guyandotte (Bolt) Mountain, Wyoming County during the
year 2000 survey.

Figures 5-9B. GIS maps for four of the historical study sites. Additional GIS maps and methods can be found in Canterbury et al. 2001.

METALTON

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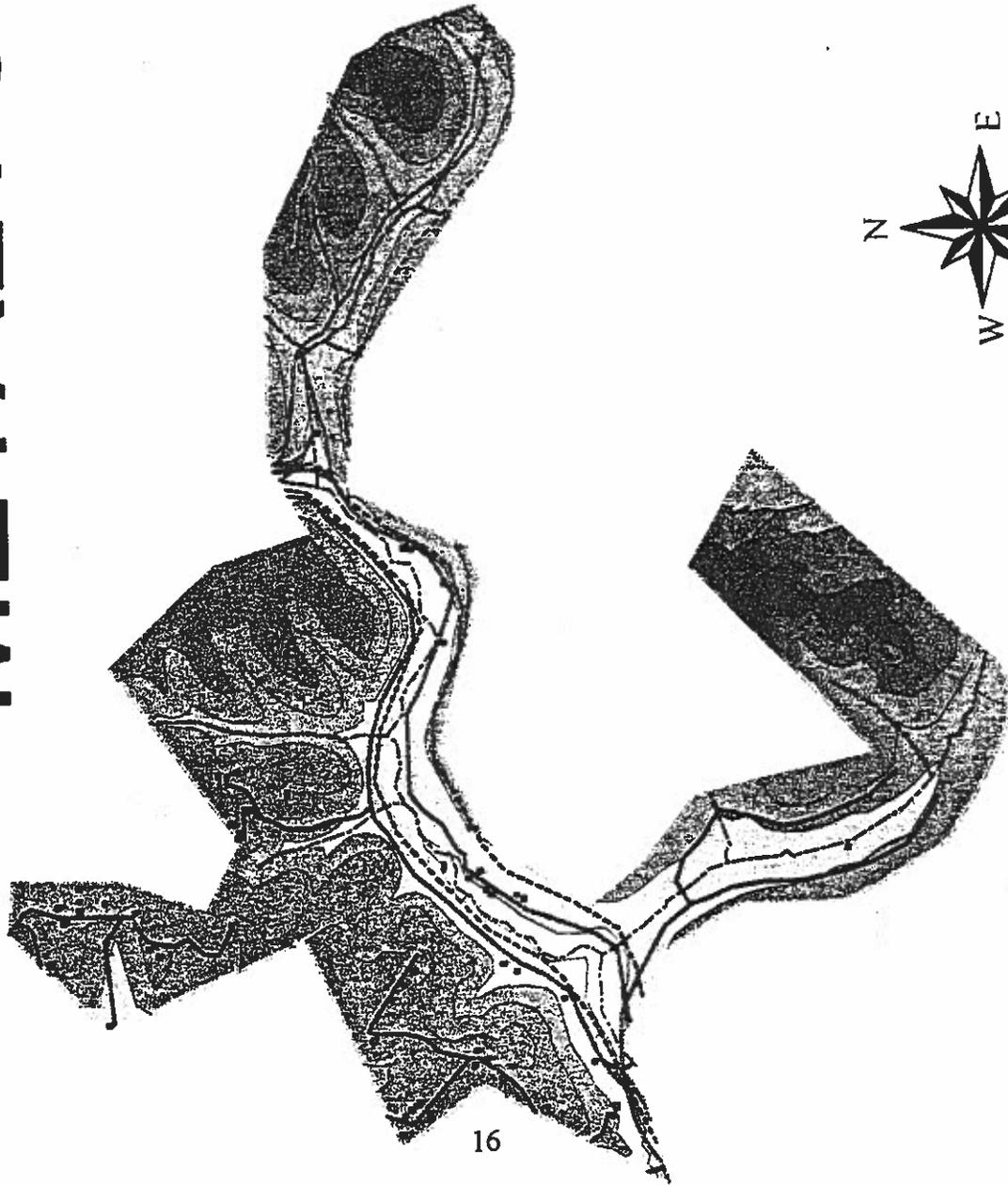
LEGEND

/\/ buildings
/\/ powerlines
/\/ railroads
/\/ roads
/\/ streams

LEGEND

elev 1920-2000ft
elev 2001-2080ft
elev 2081-2160ft
elev 2161-2240ft
elev 2241-2320ft
elev 2321-2400ft

2 snakes per 100 person hours

N
E
S
W
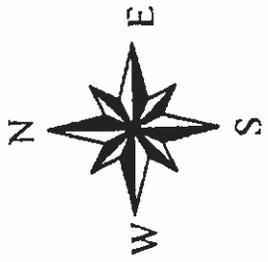
GATEWOOD
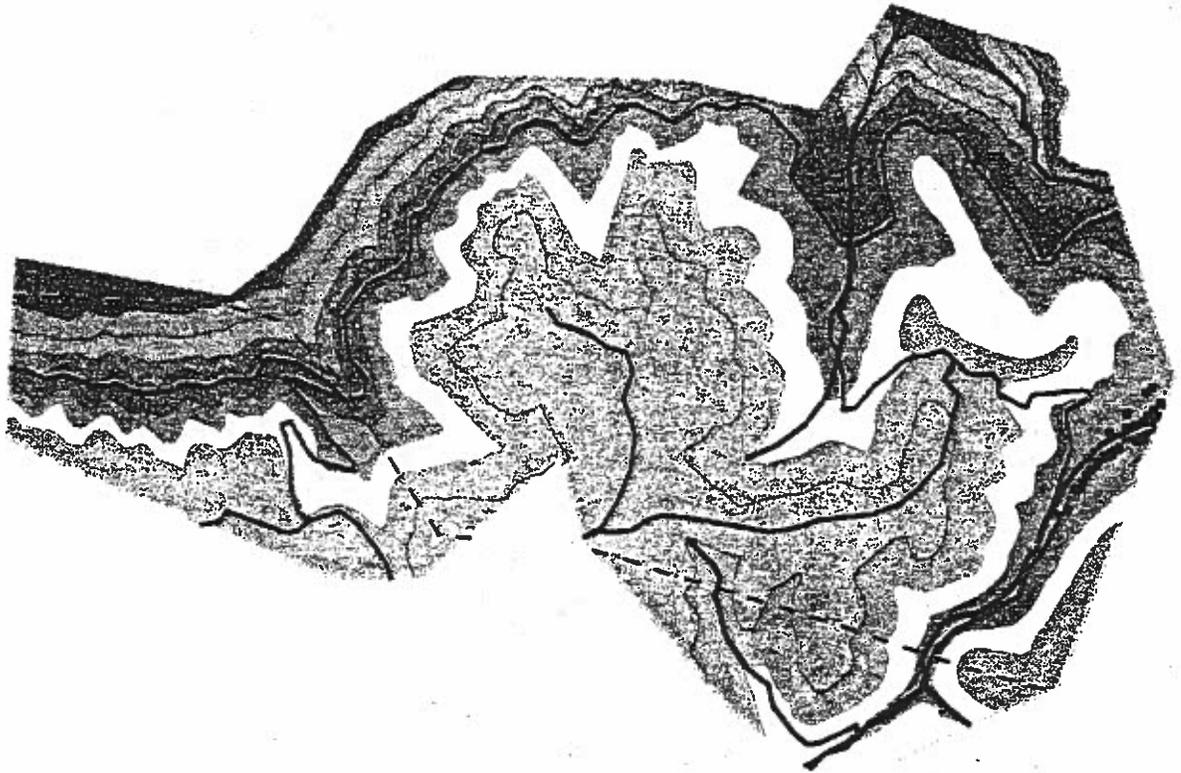
Legend

- buildings
- powerlines
- roads
- streams

Legend

- elev 1080-1200ft
- elev 1201-1320ft
- elev 1321-1440ft
- elev 1441-1560ft
- elev 1561-1680ft
- elev 1681-1800ft
- elev 1801-1920ft
- elev 1921-2040ft
- elev 2041-2160ft
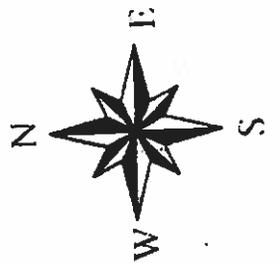
3 Snakes per 100 person hours
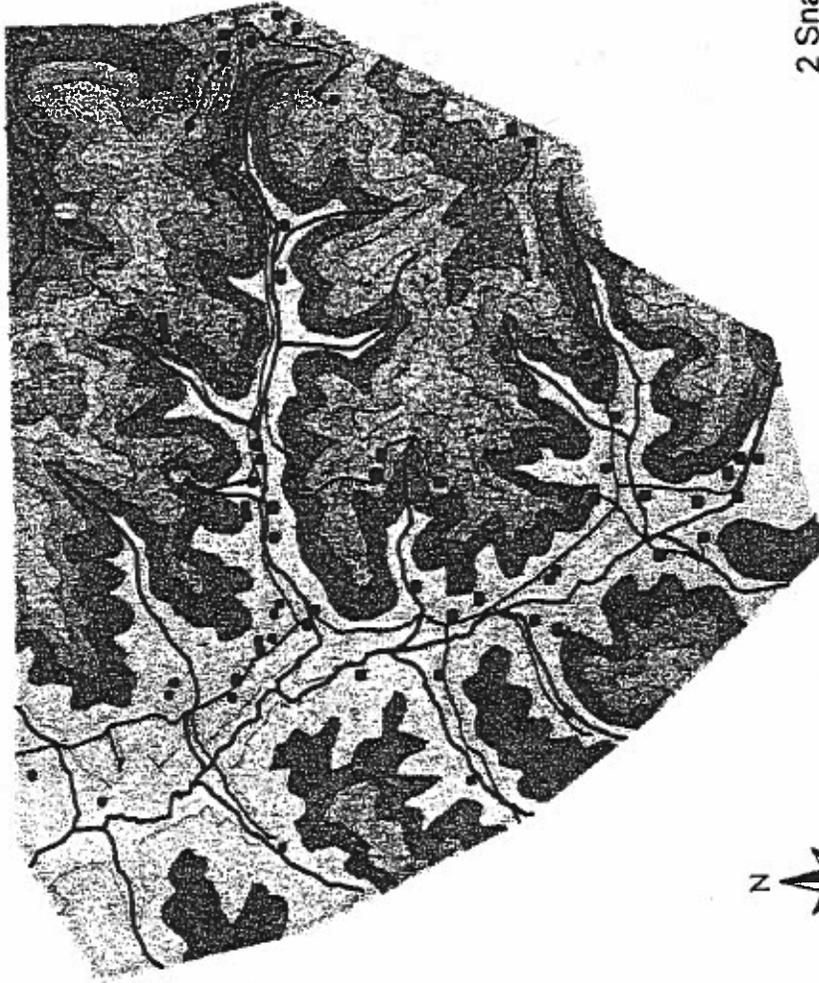

1045

GLEN ROGERS
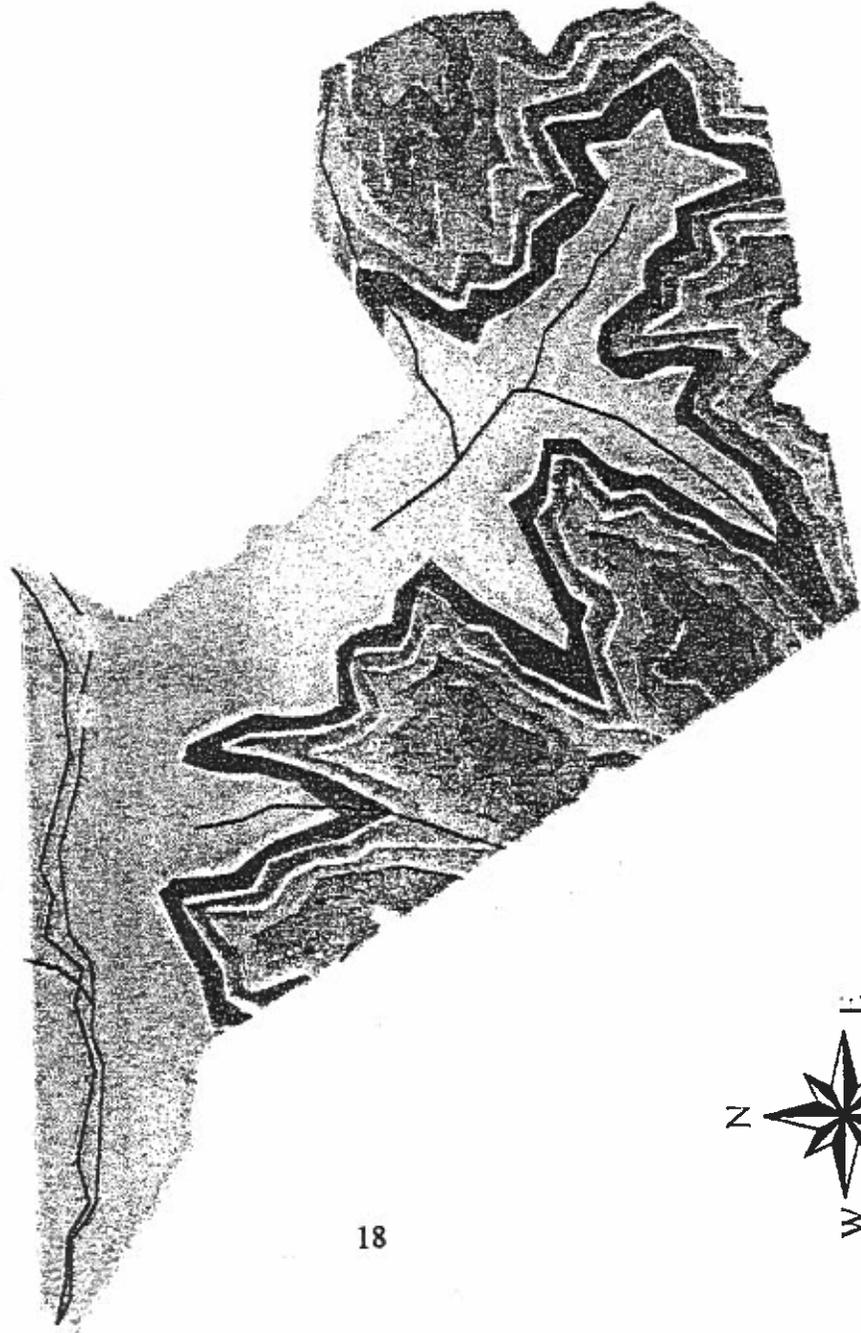
Legend

ponds
roads
streams

Legend

elev 2000-2080
elev 2081-2160
elev 2161-2240
elev 2241-2320
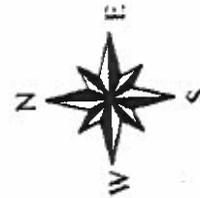elev 2321-2400
elev 2401-2480
elev 2481-2560
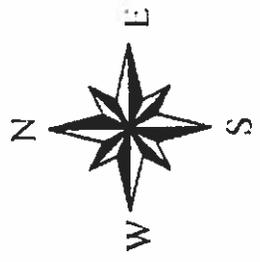
9 snakes per 100 person hours

18

N
E
S
W

MAPLE MEADOW (A)

Legend
- buildings
- ponds
- roads
- streams

Legend
- elev 1920-2000ft
- elev 2001-2080ft
- elev 2081-2160ft
- elev 2161-2240ft
- elev 2241-2320ft

2 Snakes per 100 person hours

N E S W

MAPLE MEADOW (B)

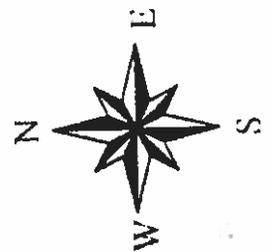**Legend**
- buildings
- roads
- streams

Legend
- elev 1920-2000ft
- elev 2001-2080ft
- elev 2081-2160ft
- elev 2161-2240ft

2 Snakes per 100 person hours